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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII CLEVELAND, OHIO, OCTOBER 6, 1904 NUMBER 40

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, OCTOBER 6, 1904 NUMBER 40

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Gauged by pig iron alone, the iron market improvement referred to last week has made further progress. Not as marked betterment is discernible in finished material demand but developments there are encouraging, with prospects that the larger scale of mill operations will last well toward the end of the year. It need hardly be said that the railroads will be the deciding factor in the iron market of the next three months. Some beginnings of demand from that source appear now; but as long as the important question of rail requirements for next year is allowed to remain open, data for a definite opinion as to the extent of iron and steel activity in the coming half year are inadequate. It must be said, however, that pessimistic predictions are decidedly tempered by the improvement in the iron trade in the past fortnight, and there is now a more general expectation of better things.

The more active market for foundry iron that was a feature of the last ten days of September is still noteworthy, and reports from all sections now agree as to this, as they did not ten days ago. Foundries are finding an increasing demand for their products—not a marked increase, but enough to beget confidence, and to lead to buying. The number of inquiries, and the good aggregate tonnage they represent, for pig iron to be delivered in the first quarter of 1905, indicates a growing desire to take advantage of present low prices; it is an indication also that many foundries are provided with iron for the balance of the year. Furnacemen are showing more plainly their unwillingness to keep on selling iron at the unsatisfactory prices of this year, and are little disposed to do business for 1905 except at better figures. Prices show more firmness and in the case of Northern furnaces there has been a general coming up from the minimum of $11.50 for No. 2 foundry to $11.75, while $11.85 and $12 are now commonly held. The Southern furnaces are increasing production slightly and at the same time cutting down stocks somewhat, so that $9.50 Birmingham may be considered more thoroughly established than at any time this year. While all centers report an enlargement of foundry demand, there is significance in the increased business in the Pittsburg district as indicating the beginning of improvement in foundries that depend largely upon orders from iron and steel works.

The situation apart from pig iron is better in a number of lines. Two more large freighters have been booked by lake shipyards and three or four are counted on as sure to be placed in the near future, while the amount of lake work involved in projects that are still in the air, though reckoned as good probabilities, gives the plate mills a distinctly better outlook. New car construction has taken a start at both Eastern and Western works, the Pennsylvania Co. ordering 600 steel cars, while in the West the Pere Marquette-C. H. & D. order for 4,000 cars reported pending some weeks ago is now reported definitely booked. Agricultural machinery manufacturers have been sending in liberal specifications for bars and the mills see their way ahead close to the end of the year. Chicago has a number of building projects under way and in plan, that will require about 12,000 tons of structural steel. In the East the structural situation is quiet, while Pittsburg's principal prospect is the new Wabash freight house calling for 4,000 tons of steel.

Reports of cutting in billets are gratuitous. There has not been enough business offered to test the new prices seriously and there is no good evidence of breaks in the agreement. In fact the attitude of manufacturers of all forms of finished material has been firmer, rather than weaker, in the past fortnight.

Indications point to a heavier shipment of Lake Superior ore this year than has been counted on at any time by authorities in that trade. It seems certain that the Steel Corporation will continue its policy of carrying a good reserve on Lake Erie docks and in furnace yards. The September movement on the lakes exceeded that of September, 1903, by over 1,000,000 tons, and if only the October and November movement of last year are duplicated this season the total will be close to 18,500,000 tons, as against predictions early in the year of 14,500,000 tons. In addition to the Steel Corporation's activity in ore shipments attention has been directed to its greatly enlarged coke production, which has suggested the possibility of a coke accumulation such as was maintained under the old Carnegie regime.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, Oct. 5.

The activity of the pig iron market, which was the dominating feature in the local iron and steel trade in September, continues, and the general buying on the part of foundries and rolling mills indicates the beginning of the first healthy improvement in eighteen months. The situation seems devoid of the artificial features which accompanied the spurts earlier in the year, and sentiment generally is more favorable to a gradual improvement in demand and prices and one that will not be accompanied by a display of pyrotechnics. Sales of foundry and forge iron during the past week will aggregate fully 15,000 tons for delivery through the remainder of the year, while one large buyer covered for requirements over the first quarter of next year. The buying of Bessemer has not been nearly as heavy as of other grades, yet the market has stiffened considerably in sympathy with the advances in foundry and forge. Sales of forge aggregated close to 6,000 tons and $12 Pittsburg is now the minimum, while a few furnaces are asking as high as $12.10. On foundry iron $12.70 is the general minimum on No. 2, and still higher prices are asked for a few brands. The sales of foundry, forge and Bessemer during the month of September in this market easily aggregate 50,000 tons, and the fact that not one of the orders was for more than 10,000 tons, while the majority were for less than 1,000, shows how general the buying movement has been. Foundries in this district, especially those manufacturing rolling mill equipment, report more work on their books than at any time in a year and a half, and while the tonnage they have in their shops is small, it is certainly a distinct improvement over the condition which has been prevailing.

In several of the finished lines improvement is noted. Agricultural implement manufacturers are sending in heavy specifications for material for delivery next month, when there will be a fuller operation of these plants throughout the country. Their requirements are expected to be exceedingly heavy through the winter, inasmuch as the heavy stocks which were left on their hands in the spring of last year have been cleaned up, and with good crops an improvement in the demand for implements is anticipated. Wrought pipe manufacturers also report a slightly better demand, with less shading on merchant sizes. Sheets and tin plate, however, continue dull, while some improvement is reported in the demand for nails and wire products.

There have been numerous reports about the shading of

the new pool prices on steel, but it is doubtful if the tonnage thus far offered has been sufficient to bring out concessions. The buying of billets has been limited entirely to small lots, on which the new schedule was rigidly adhered to. One of the largest steel mills in this district rolling sheet and tin bars will not take business at the present prices, contending that they are too low for a fair margin of profit. Other manufacturers, however, are taking care of the limited demand and the larger independent producers find little difficulty in meeting the new schedule.

The contract for erecting the steel work for the new Wabash freight station will be awarded this week, amounting to about 4,000 tons, but otherwise little new structural work is being figured on. The Pennsylvania Railroad Co. this week purchased 600 steel cars and also placed an order with its Altoona shops for 25 locomotives. It is reported that other railroads are beginning to figure on new rolling stock, as most of the roads in the past year have not kept up their normal replacements, to say nothing of adding to their equipment.

The new mill which the Republic Iron & Steel Co. is installing at Youngstown, O., will not only roll sheet and tin bars but will also be equipped to roll rails. It will be a combination mill, similar to that at the Ohio works of the Carnegie Steel Co. The announcement that the Republic company will become a factor in the rail trade has surprised many, as it was not believed such a plan would be carried out. Whether this company will work with the pools in regard to prices and tonnage when these mills are in operation cannot be learned at the present time, but it has been intimated that the product will be marketed independent of the existing pools.

The new schedule of steel bar prices and extras shows, in addition to the innovation of adding freight rates to Pittsburg prices, the names of two concerns which were not parties to the last agreement—the Lackawanna Steel Co. and the Railway Steel Spring Co. The other companies included in the agreement are the Carnegie Steel Co., Jones & Laughlin Steel Co., Illinois Steel Co., Cambria Steel Co. and Republic Iron & Steel Co.

Pig Iron.—Heavy sales of pig iron during the past month have stiffened the market considerably, the minimum on forge now being $12 Pittsburg, and Bessemer is held at the same price at the furnace. On No. 2 foundry $12.70 Pittsburg is the general market price, while some furnaces are holding their product at $12.85. Though iron has been sold for delivery through the first quarter of next year, most of the furnaces refuse to entertain offers for that delivery at as much as 25 cents advance over today's prices. One large buyer of foundry and forge iron originally in the market for 2,000 tons, purchased 10,000 tons. Iron mills in this district have pretty generally covered their requirements to the end of the year, and one furnace is no longer quoting on forge for delivery this year, and will not entertain offers for next year's delivery. One large buyer of mill iron is in the market at present for 8,000 tons, but the business will hardly be placed this week. Bessemer iron is firm at $12 Pittsburg, and for delivery into next year $12.25 at the furnace is asked. We revise quotations as follows:

Bessemer, Valley	$12 00 to 12 10
Bessemer, Pittsburg	12 85 to 12 95
No. 1 Foundry	13 00 to 13 25
No. 2 Foundry	12 70 to 12 85
Gray forge, Pittsburg	12 00 to 12 10
Chilled basic, Valley	11 65 to 11 75
Chilled basic, Pittsburg	12 50 to 12 60

Steel.—The buying of billets and sheet bars continues in small lots only, and no credence can be placed on the reports of shading, as not sufficient tonnage has been offered the mills to make lower prices an inducement. We make the following quotations: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $19.50, f. o. b. mill, Pittsburg, with actual freight added to point of delivery; 0.26 and including 0.60 carbon, $1 advance; 0.61 to 1.00 carbon, $2 advance. Billets smaller than 4 x 4 inches, $2 advance; sheet and tin bars, $2 advance. Bessemer and open-hearth rods are held at $25 to $25.50.

Ferro-Manganese.—The market continues quiet. Low prices prevail and foreign ferro can no longer compete with the domestic. We quote ferro, 80 percent, at $41 in carload lots delivered at buyer's mill at any point east of the Mississippi.

Muck Bar.—There is little demand for muck iron, which is held nominally at $23.50 to $24, f. o. b. mill, Pittsburg.

Skelp.—Most of the skelp mills are operating in full on orders placed some time ago for delivery through the last quarter. Little new business is being offered however. We quote grooved steel at 1.25c and sheared at 1.30c to 1.35c. Iron grooved is held at 1.35c to 1.40c and sheared at 1.45c to 1.47½c.

Rails and Track Material.—A little buying of heavy section rails is reported, and the light rail market continues quiet. We quote: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 to 40 pounds, $20 to $21. Spikes, 1.55c to 1.60c.

Plates.—The Pennsylvania Railroad Co.'s order for 600 steel cars was divided between the Pressed Steel Car Co. and the Cambria Steel Co. To fill this contract about 6,000 tons of plates will be required. Specifications on plate contracts have increased slightly, but the reduced prices have had nothing to do with the increased tonnage now entering the mills. Further business from lake shipyards is expected to be of considerable amount. We quote: Tank plate, ¼ inch thick, 6¼ to 24 inches, inclusive, 1.30 f. o. b. mill, Pittsburg; over 24 inches up to 100 inches, 1.40c. Extras are as follows per pound: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 inches up to 110 inches in width, not less than 5c per 100 lb. extra; plates 110 inches to 115 inches wide, not less than 10c extra; 115 to 120 inches, 15c extra; plates 120 inches to 125 inches wide, not less than 25c extra; plates 125 inches to 130 inches, not less than 50c extra; plates 130 inches wide, not less than $1 extra; plates 3-16 inch thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

Structural Material.—The Wabash Railroad will this week place an order for the erection of its freight station requiring about 4,000 tons. Outside of this order there is nothing new. We make the following quotations: Beams and channels, up to 15 inches, 1.40c; over 15 inches, 1.50c; angles, 3 x 2 up to 6 x 6, 1.40c; zees, 1.40c; tees, 1.45c; angles, from 3 to 16 inches, 1.40c; universal and sheared plates, 6¼ to 24 inches inclusive, 1.30c; over 24 inches, 1.40c base.

Sheets.—The sheet market shows little improvement, and on an occasional lot 2c is quoted by some of the mills. Most of the sheet producers are asking 2.10c and are having little difficulty in securing this price on 28 gauge. We quote on black sheets, 25 bundles and over: No. 8, 1.60c; No. 9, 1.65c; Nos. 12 to 14, 1.70c; Nos. 15-17, 1.75c to 1.80c; Nos. 18-21, 1.85c to 1.90c; Nos. 22-24, 1.95c; Nos. 25-26, 2c; No. 27, 2.05c; No. 28, 2.10c to 2.15c; No. 29, 2.35c to 2.40c; No. 30, 2.50c to 2.55c. Galvanized: Nos. 12-17, 2.20c to 2.25c; Nos. 18-21, 2.35c to 2.40c; Nos. 22-24, 2.50c to 2.55c; Nos. 25-26, 2.65c to 2.70c; No. 7, 2.90c; No. 28, 3.10c; No. 29, 3.45c to 3.50c; No. 30, 3.85c to 3.90c.

Wire and Wire Nails.—The demand for nails and wire products is reported somewhat better and there is absolutely no shading in this market, although lower prices continue to be reported from the west. We make the following quotations: Wire nails, jobbers' carload lots, $1.60; retailers' carloads, $1.65, and less than carloads, $1.75; painted barb wire, $1.75 to jobbers in carloads; retailers' carloads, $1.80, and less than carloads, $1.90, with 30 cents for galvanizing. Annealed smooth fence wire is held at $1.45, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron and steel cut nails are held at $1.65 to $1.70.

Merchant Steel.—Demand for steel from machinery manufacturers is reported improving, although the gross tonnage that is being offered the mills is not great. There is no change in the shafting situation, and no great improvement will come in this line until there is more new con-

struction than there is going on at present. We quote as follows: Toe calk, 1.90c; carriage spring steel, 1.75c; tire steel, 150c to 1.55c; plow steel, 6 inches and under, 1.35c for Bessemer and open-hearth; plow slabs, ¼ inch and heavier, 1.60c. Drawn and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carload lots.

Pipes and Tubes.—A slightly better demand is reported, and there is less shading on merchant sizes. Large orders for line pipe are pending. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	71	55	69	53
⅜ and ½ inch	75	63	73	61
¾ to 6 inches	79	69	77½	67½
7 to 12 inches	74	59	72½	57
Extra Strong Plain Ends.				
⅛ to ⅜ inch	64	52	62	50
½ to 4 inches	71	59	69	57
4½ to 8 inches	67	55	65	53
Double extra strong plain ends, ½ to 8 inches	60	49	58	47

MERCHANT BOILER TUBES, LESS CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inch	48	43
1¾ to 2¼ inches	60	43
2½ inches	62	48
2¾ to 5 inches	68	55
6 to 13 inches	60	43

Bars.—Agricultural implement manufacturers are now sending in heavy specifications for bars for delivery beginning next month. When the slump in the market came last year most of the manufacturers were caught with heavy stocks on their hands and these have nearly all been disposed of. The demand for merchant shapes from this source promises to be extremely heavy this winter, and as their stocks of material are low the present specifications are correspondingly heavy. We quote: Bar iron, 1.25c to 1.30c, Pittsburg; hoops, 1.55c, and bands 1.35c, both taking bar extras. Bessemer and open-hearth steel bars, 1.30c; plow and cultivator beams, 1.30c, net; channels, angles, zees and tees, under 3 inches, 1.40c; the following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Old Material.—The market continues very quiet, and little material is changing hands. Dealers continue to ask prices at which consumers are only willing to buy for immediate requirements. Stocks in dealers' yards are heavy and they are all holding for a higher market. We quote as follows: Re-rolling rails, $12 to $12.50; re-melting rails, $11.50 to $12; low phosphorus melting stock, $15 to $15.50; sheet scrap, $9 to $9.50; No. 1 wrought, $12 to $12.50; cast iron borings, $6 to $6.50; No. 1 cast, $10 to $10.50.

Coke.—While the H. C. Frick Co. is blowing in all its available idle ovens, the independent producers find little improvement in demand and prices continue low. Several coke contracts have been closed during the week, deliveries extending to July next year at $1.90 for strictly Connellsville foundry, an exceedingly low price when the extended delivery is considered. High grade Connellsville foundry coke is selling at $1.75 to $1.85, and furnace at $1.40 to $1.45. For the week ending Sept. 23 the production of the upper region amounted to 215,683 tons and the lower to 60,460 tons. Only about 6,000 ovens are now idle.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Oct. 4.

There is more life to Western iron and steel markets this week than has been seen here in months. All products have shared in the improved demand; and from the activity of the present inquiry there is reason to anticipate a continuance of the buying movement for several weeks. The sentiment of the trade in all its branches is optimistic. Pig iron continues to lead in sales and also in the inquiry pending. Both Northern and Southern furnaces have booked a large tonnage for deliveries running through the balance of this year, and at least one Southern interest has deviated from the policy of producers south of the Ohio river by taking several orders at present prices for delivery in the first quarter of 1905. Prices of pig iron generally are firm, in some instances having advanced 25 cents a ton. Activity in bars is also marked, specifications for steel bars showing a decided improvement over the figures for the corresponding period a month ago.

Bar iron remains at the quotations of a week ago, though there is a stronger disposition to ask 1.40c, in view of the stimulus the market has received. There is plainly perceptible an improvement in the sheet trade, with the cutting of prices much less evident except on heavy gauges. The structural steel market, while without material improvement or change from the conditions reported a week ago, shows good symptoms. Plans for the construction of new buildings in this city have come up in a marked way within the past few weeks, and there are now pending projects for the erection of seven large office buildings in the downtown district, each one of which will require not less than 1,000 tons of steel. On two of these buildings work has already commenced, and it is expected the foundations of the others will be laid before the cold weather sets in. Billets and wire rods are both quiet, the only demand felt in this market being for small lots of forging billets. Plates are brisk, the contracts for the five freight steamers recently let to the American Shipbuilding Co. having strengthened the situation. Rails are without change, and new business for standard sections is of small proportions. Light rails continue to show improved demand, though without change as to price. There is a good activity in tubular goods and specifications are coming in freely. Scrap seems to have recovered the ground it lost a week ago and prices on several products have been restored to their former level. Coke is active, the fear of a car shortage having brought many consumers into the market with orders for immediate shipment.

An important transaction in cast iron pipe is the contract let by the commissioners of the Panama canal for 4,300 tons.

Pig Iron.—The market has strengthened under the continued buying of the past three weeks. Prices are firm, and while no change has yet been made by any of the big sellers, the sentiment among them is very strong. In the case of the few isolated furnaces in the South selling at $9.25 there has been an advance to the Birmingham basis of $9.50 for No. 2 foundry within the past ten days, though it is necessary in correctly reporting the situation to state that these interests have not at any time taken much business. There has also been some business taken at $9.25, but the irons offered at this price are generally of a high phosphorus content and meet the wants of only a few buyers. The week under review has seen no diminution in the demand. Southern furnaces have shared to a greater degree than heretofore in the buying movement, one Birmingham company reporting that its transactions in this period amounted to nearly 15,000 tons. There were a few orders taken by a Southern interest for delivery in 1905, but with this exception producers south of the Ohio river are adhering strictly to their policy of declining to quote on anything for delivery in the new year. Little change is to be noted in the condition of Northern furnaces. Local No. 2 is still selling at $13.50 Chicago. Sales have declined somewhat during the past week, though this retrogression is due largely to the fact that producers are unwilling to load themselves with too great a tonnage at present prices. Our quotations follow:

Lake Superior Charcoal	$ 15 00
Northern Coke Foundry No. 1	14 00
Northern Coke Foundry No. 2	13 50
Northern Coke Foundry No. 3	13 00
Northern Scotch Foundry	15 00 to 15 50
Ohio Strong Softeners No. 1	14 50 to 15 00
Ohio Strong Softeners No. 2	14 00 to 14 50
Southern Coke Foundry No. 1	13 65
Southern Coke Foundry No. 2	13 15
Southern Coke Foundry No. 3	12 90
Southern Coke Foundry No. 4	12 65
Southern No. 1 Soft	13 65
Southern No. 2 Soft	13 15
Southern Gray Forge	12 65
Southern Mottled	12 40
Southern Silveries (4% to 6% Silicon)	14 85 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 25
Malleable Bessemer	14 00
Alabama Basic	13 15 to 13 40

Billets.—Except for a few small lots of forging billets which are demand, the local market is without life. Association prices are being adhered to in the transactions that have come to the front so far. We quote Chicago prices on Bessemer and open-hearth billets, 4 x 4 and larger, up to .25 carbon, $22.50; up to and including .60 carbon, $1 extra.

Billets 3⅞ in. and smaller, and sheet and tin bars, $24.50. Wire rods, $26 to $27 Pittsburg.

Bars.—Mills report a satisfactory tonnage in both products during the week under review. Particularly have the specifications for steel bars been coming in briskly, and producers are much encouraged over the outlook. Bar iron has steadily improved, and prices are firm at 1.35c to 1.40c. Following the recent order for 4,000 cars given the American Car & Foundry Co. by the C. H. & D., a number of smaller orders have come from other roads. Specifications, however, from railroads and car builders might be much improved, and the increased demand for cars is taken as an indication that a better business will be coming from these sources shortly. Angels and hoops are in fair demand, though small angles rolled from old rails are still selling around 1.25c at the mill. We quote Chicago delivery, as follows: Iron bars, 1.35c to 1.40c; soft steel bars, 1.40c to 1.41/2c; soft steel angles, less than 3 x 3, 1.56½c; hoops, 1.71½c. On small lots from store, we quote iron bars, 1.70c to 1.75c base full extras; steel bars, 1.70c to 1.80c base half extras; hoops, 2.10c rates, full extras.

Sheets.—An excellent tonnage has come forward in the past week, and mills are holding their prices more firmly than for some time past. On heavy gauges only is cutting to any extent being done. With this reservation, we quote one pass, cold rolled, blue annealed sheets, carload lots, mill shipments, Chicago delivery, as follows: Nos. 9 and 10, 1.71½c to 1.76½c; Nos. 11 and 12, 1.76½c to 1.81½c; Nos. 13 and 14, 1.81½c to 1.86½c; Nos. 15 and 16, 1.91½c to 1.96½c. On box annealed, one pass, cold rolled: Nos. 18 and 20, 2.01½c to 2.06½c; Nos. 22 and 24, 2.06½c to 2.11½c; Nos. 25 and 26, 2.11½c to 2.16½c; No. 27, 2.16½c to 2.21½c; No. 28, 2.26½c to 2.31½c; No. 29, 2.41½c to 2.46½c; No. 30, 2.51½c to 2.56½c. We quote lots from jobbers' stocks as follows: No. 10, 1.90c to 2c; No. 12, 1.95c to 2.05c; No. 14, 2c to 2.10c; No. 16, 2.10c to 2.20c; No. 18, 2.20c to 2.30c; No. 20, 2.25c to 2.35c; No. 22, 2.30c to 2.40c; No. 24, 2.35c to 2.45c; No. 26, 2.40c to 2.50c; No. 27, 2.50c to 2.60c; No. 28, 2.60c to 2.70c; No. 29, 2.70c to 2.80c. Galvanized sheets are strong, and we quote Pittsburg discounts, f. o. b. mill, 80 and 5 to 80 and 10. For shipment from stock, we quote heavy gauges and wide widths, 75 and 5 to 75 and 10 percent; for light gauges, 75, 10 and 5½ percent to 80 percent.

Structural Steel.—While the tonnage placed with mills continues light, the outlook is very bright. Plans for the construction of at least seven large office, theater and bank buildings in this city are under way, and it is expected that work on all of them will be commenced before the cold weather sets in. These projects include the Majestic Theater and office building, 2,500 tons; new Chicago Stock Exchange building, 1,000 tons; Northern Trust building, 1,000 tons; Corn Exchange Bank building, 1,000 tons; Union League Club 750 tons, and two office and mercantile buildings to be erected on State street, requiring together about 1,500 tons. These figures are in every case approximate, as the plans have not reached the point where an idea can be obtained of the amount of steel that will be required. Western producers of structural angles up to 6 x 6 are selling at $1 a ton below association prices. With this reservation, we quote carload lots, as follows: Beams and channels, 3 to 15 in., inclusive, 1.56½c, Chicago; angles, 3 to 6 in., ¼-in. and heavier, 1.56½c; angles, larger than 6 in. on one or both legs, 1.66½c; beams, larger than 15 in., 1.66½c; zees, 3-in. and over, 1.56½c; tees, 3-in. and over, 1.61½c, with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. Store prices on structural materials are 1.80c to 1.90c for angles, beams, channels and zees, base sizes, with 1.90c to 2c for 18, 20 and 24-in. beams; tees, 1.85c to 1.95c. These prices are for either random lengths or cut to lengths.

Plates.—The placing of contracts for the construction of five large freight steamers with the American Shipbuilding Co. in addition to the improved buying of freight cars has given tone to the plate market. Trade has been fairly active in the past week, though marked by no large sales. Some independent interests are said to be cutting prices, but this is done only on odd sizes and in cases where the mill cannot handle the entire order of the prospective buyer. We quote Association prices, carload lots, Chicago delivery, as follows: Tank steel, ¼-in. and heavier, 24-in. wide and under, rectangular plates only, 1.46½c base; over 24-in. to 100-in. wide, 1.56½c base; flange steel, 1.66½c base; marine steel, 1.76½c base, all full extras. Plates, 3-16-in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Less than carload lots, 5c extra. Prices from store have also been changed, and we quote tank steel, ¼-in. and heavier, 1.80c to 1.90c; 3-16, 1.90c to 2c; No. 8, 1.90c to 2c; flange steel, 2.05c to 2.15c.

Rails and Tank Supplies.—The only order of importance placed with the local interest for standard rails was one of 3,500 tons from the "Soo" railroad. Specifications, however, show a slight improvement. Light rails are active and prices firmer. We quote as follows: Heavy sections 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails, $22 to $24; track supplies, f. o. b. Joliet mill, angle bars, 1.30c; spikes, first quality, 1.60c; track bolts, 3¼ x ¾, with square nuts, 2.20c to 2.30c per 100 lb.; with hexagon nuts, 2.35c to 2.45c.

Merchant Steel.—Specifications continue of good volume and new business is also of fair proportions. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 1.85c; sleigh shoe, flat sizes, 1.51½c; concave and convex, 1.60½c to 1.71½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.71½c; smooth finished tire, 1.66½c; plow steel, 2.20c and upwards, according to quality; toe calk steel, 2.01½c. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up; cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Merchant Pipe.—Mills report a continuance of the brisk demand that has been felt for the past three weeks. Jobbers are specifying heavily in anticipation of spring trade. There are no changes in prices, and we quote carload lots, mill shipments, random lengths, f. o. b. as follows:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	69.35	53.35	67.35	51.35
⅜ and ½ inches	73.35	71.35	71.35	69.35
¾ to 6 inches	77.35	67.35	75.85	65.85
7 to 12 inches	72.35	57.35	70.85	55.85

Boiler Tubes.—New business is light, and jobbers are said to be slightly shading prices. We quote carload lots, mill shipments, Chicago delivery, as follows:

BOILER TUBES.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	46.35	41.35	52.35
1¾ to 2¼ inch	58.35	41.35	40.35
2½ inch	60.35	46.35	43.35
2¾ inch to 5 inch	66.35	53.35	Up to 4 inches. 50.85
6 to 13 inch	58.35	41.35	

The following are the agreed discounts from store:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches	42½	37½	40
1¾ to 2½ inches	52½	35	37½
2½ inches	55	37½	40
2¾ to 5 inches	62½	47½	47½
6 inches and larger	52½	35	..
Old iron rails			$15 75 to 16 25

Cast Iron Pipe.—The United States Cast Iron Pipe & dry Co. closed a contract with the Panama canal commissioners in Philadelphia for 4,300 tons of pipe in sizes ranging from 6 to 20-in. inclusive. The delivery of this material is to be made at Colon, Panama. This is the only noteworthy contract of the week. Routine demand is of fair proportions. Prices are firm and without change. We quote carload lots, Chicago delivery, as follows: 4-in. water pipe, $25.50; 6 to 12-in., $24.50; larger sizes, $24; gas pipe, $1 a ton higher.

Wire Products.—Every mill of the leading interest is running to full capacity to meet the greatly increased demand for wire products. The country apparently was practically denuded of stocks, and since the reduction in prices it has been impossible to satisfy all the demands for prompt shipment. In districts west of the Rocky Mountains, some cutting of prices is being done, due to the competition of the Colorado producer. With this exception, prices are being maintained. We quote carload lots, to jobbers, mill shipments, Chicago delivery, as follows: Wire nails, 1.75c; painted barb wire, 1.90c; galvanized barb wire, 2.20c; smooth annealed wire, 1.60c; smooth galvanized wire, 1.90c; polished staples, 1.85c; galvanized staples, 2.15c. Less than carload

lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10c extra on less than carload lots. Bale ties are unchanged at 82½c and 5 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o .b. Joliet and DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—Owing to the possibility of a car famine when snow is again on the ground, consumers have been freely covering for their needs and laying in stocks of coke for winter use. This improved buying has stimulated the market to some extent, and has had a tendency to make prices firmer. There are no changes announced, as yet, however, and we quote coke from Wise County, Va., $1.90 to $2 at the ovens, or $4.15 to $4.25 Chicago. Coke from the Pocahontas and New River districts, the freight rate of which to Chicago is $2.65, is selling on the basis of $1.65 to $1.75 at the ovens. Connellsville standard 72-hour coke is firm at $2 at the ovens, or $4.65 Chicago. Owing to an error, we have been quoting Solvay coke from the Milwaukee plant at $4.50 Chicago. The lowest this product has sold at is $4.65, and from this price the market ranges to $4.75, according to the tonnage.

Old Material.—Dealers in scrap are holding the market very firmly, and in a great measure have recovered the ground lost a week ago. As a result of the improved conditions in other products, scrap has enjoyed a better demand from consumers than in several weeks, and those prices that were reduced in our last report have been advanced to their former figure. We quote dealers' selling prices, gross tons, as follows:

Old steel rails (4 feet and over)	11 50 to 12 00
Old steel rails (less than 4 feet)	10 50 to 11 00
Relaying rails, subject to inspection	21 50 to 22 50
Relaying rails for sidetracks	18 00 to 20 00
Old wheels	11 00 to 11 50
Heavy melting steel	10 00 to 11 00
Mixed country steel	7 00 to 7 50
Low phosphorus scrap (.04 and under)	11 00 to 12 00

The following quotations are for net tons:

No. 1 R. R. wrought	12 00 to 12 50
No. 2 R. R. wrought	11 00 to 11 50
Shafting	12 50 to 13 00
Dealers' Forge, No. 1	9 00 to 10 00
Wrought pipe and flues	8 50 to 9 00
No. 1 cast, 150 lb. and less	10 00 to 10 50
No. 1 mill	6 00 to 6 50
Country sheet	5 00 to 5 50
No. 1 boilers, cut	8 50 to 9 00
Boiler punchings	9 50 to 10 00
Iron car axles	16 50 to 17 00
Steel car axles	13 50 to 14 00
Iron axle turnings	7 50 to 8 00
Steel axle turnings	7 50 to 8 00
Cast borings	4 50 to 5 00
Mixed borings, etc.	4 25 to 4 50
Wrought turnings	6 75 to 7 25
Machine shop turnings	6 75 to 7 25
Railroad malleable	9 00 to 9 50
Agricultural malleable	9 00 to 9 50
Stove plate and light cast scrap	9 00 to 9 50
Old iron splice bars	13 00 to 13 50

CLEVELAND

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Oct. 5.

Iron Ore.—As anticipated last week, freight rates advanced 5 cents, making the rates 70 from the head of the lakes, 60 from Marquette and 55 from Escanaba. There is now no surplus tonnage and ore is moving freely. Merchant furnaces which had been hesitating about ordering ore on account of the uncertainty concerning the future demand for pig iron have been buying recently, but not in large quantities. Although buying throughout the season has been very slow, sellers say they have disposed of a larger tonnage than seemed possible several months ago. Old range non-Bessemer is selling at $2.65 to $2.75 and Mesabi non-Bessemer at $2.50. No old range Bessemer of standard quality is now sold at $3, the usual price being $3.25, while some sales have been made at $3.35. Mesabi Bessemers sell at $2.75 to $3.

Shipments from upper lake ports for September show the handsome increase of 1,059,803 tons compared with September of last year. The decrease for the season to Sept. 1 was 6,813,858 tons and the decrease to Oct. 1 is cut down to 5,754,055 tons. The September shipments by ports were:

	Sept. 1903	Sept. 1904
Escanaba	503,518	594,338
Gladstone	15,698	*
Marquette	239,871	360,034
Ashland	344,615	463,762
Superior	500,493	766,557
Duluth	696,409	892,087
Two Harbors	646,035	929,664
	2,946,639	4,006,442

The shipments of the seasons to Oct. 1 are as follows:

	1903	1904
Escanaba	3,352,989	2,292,646
Gladstone	56,354	480
Marquette	1,651,696	1,178,044
Ashland	2,295,274	1,431,731
Superior	3,185,230	2,683,034
Duluth	4,462,439	3,041,006
Two Harbors	4,372,511	2,995,497
	19,376,493	13,622,438

Pig Iron.—Favorable reports of increased sales in other cities have had some effect in Cleveland, where inquiries are more numerous, but no large sales have been made and small sales are not as frequent as might be desired. All business is for the last quarter, as furnaces will not quote for delivery after Jan. 1. For No. 2 foundry, $12 is the usual Valley price, but sales of 200 to 300 tons are made by some furnaces at $11.75, while other producers hold firmly for $12. The Southern market is firmer and the $9.25 price has practically disappeared, business now being on a basis of $9.50 Birmingham, for No. 2. We quote as follows for Cleveland delivery:

Bessemer	$12 60 to 12 75
No. 1 Strong Foundry	12 85 to 13 00
No. 2 Strong Foundry	12 60 to 12 85
No. 3 Foundry	12 25 to 12 50
No. 2 Southern	13 10 to 13 35
Gray Forge	11 85 to 12 00
Gray Forge, Southern	12 00 to 12 15
Lake Superior charcoal	14 50 to 15 00

Finished Material.—The orders recently given for huge freight vessels and the prospect that more contracts will soon be made are very encouraging developments which will improve conditions not merely by adding tonnage of shapes and plates for the new boats but also by stimulating a feeling of confidence in improvement in demand from other sources, for lake as well as railroad traffic is an indicator of trade conditions. Aside from the ordering of the freighters, there have been no events of special importance, but, generally speaking, there is a better market. The principal producer is selling more rapidly than it can ship, a condition which had not existed for many months until very recently. Some contracts for steel bars at 1.39½c Cleveland, for Bessemer, and 1.44½c for open-hearth have been entered into by consumers who had been pursuing a hand to mouth policy and specifications against contracts have been coming in freely. Although bar iron is still quoted at 1.30c Youngstown, a lower price was made within a few days to a car company. It is suspected that this price was made in connection with the sale of some other material to the manufacturer of cars. The principal producer of sheets is showing more firmness in adhering to prices, but there is much competition among the independents. The prices of the principal producers through jobbers are as follows, Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.64½c; No. 11-12, 1.69½c; No. 14, 1.79½c; No. 16, 1.89½c; No. 27, 2.14½c; No. 28, 2.24½c. Galvanized, mill sales, No. 14, 2.24½c; No. 16, 2.34½c; No. 18-20, 2.49½c; No. 22-24, 2.64½c; No. 25-26, 2.84½c; No. 27, 3.04½c; No. 28, 3.24½c. Out of stock, black sheets: ¼-in. 1.90c; 3-16-in., 2c. Blue annealed: No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: No. 18-20, 2.35c; No. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c. Galvanized out of stock: No. 16, 2.60c; No. 18-20, 2.70c; No. 22-24, 2.85c; No. 26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 30, 4.25c.

Old Material.—Old steel rails, heavy steel and bushelings are from 50 cents to $1 higher, but business shows little improvement and dealers are still holding large quantities. We quote as follows, gross tons, Cleveland delivery:

Old iron rails	$15 00 to 15 50
Old steel rails (over 6 feet)	12 50 to 13 50
Old steel rails (under 6 feet)	12 00 to 12 50
Old car wheels	10 00 to 11 00
Steel boiler plate	9 00 to 10 00
Malleable iron (railroad)	10 00 to 10 50
Malleable iron (agricultural)	8 00 to 9 00
Heavy steel	10 50 to 11 50

We quote as follows, net tons:

No. 1 R. R. wrought	$10 50 to 11 50
No. 1 busheling	10 00 to 10 50
No. 1 machine cast	9 50 to 10 50
Iron axles	16 00 to 16 50
Axle turnings	7 00 to 8 00
Wrought turnings (free from cast)	6 00 to 6 50
Grate bars	7 00 to 8 00
Pipes and flues	8 00 to 8 50
Tank iron	7 50 to 8 00
Hoop and band iron	5 00 to 5 50
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 6 50
Stove plate	8 00 to 9 00
Steel axles	13 00 to 14 00
Cast borings	5 00 to 5 50

CINCINNATI.

Oct. 4.

The coke market is somewhat more active and prices are well maintained, although there is no advance in the quotations. Connellsville foundry coke is selling at $1.90 to $2.05 f. o. b. ovens, with $2 the usual asking price.

Pig Iron.—The market has a better tone this week and there is quite a good deal of inquiry. The offerings of Southern iron are becoming smaller and some of the large interests have withdrawn from the market. Several fairly good sized round lots have been sold during the week. A Michigan concern took 2,000 tons and the pipe foundries have been buyers to some extent, but this tonnage can only be estimated, although it runs over the 1,000-ton mark. A Central Ohio concern took 600 tons, and about 3,000 tons were placed in Louisville. There are several good inquiries in the market all for next year delivery, but furnaces seem unwilling to take on tonnage for next year at present prices. This feature is believed to be making buyers a little keen to cover if they can. There is a good demand for high-silicon silvery and some inquiry for basic. The market for basic seems to be strengthening and quotations prevailing some time ago are not now duplicated. Southern furnace interests are apparently strong in their attitude and are holding their agents in check in regard to taking business. It is doubtful if anything better than $9.50 Birmingham can be done now, and some in the trade look for prices to advance. It is thought on the other hand, that any advance in the market will put a stop to the inquiry. As the inquiry is mainly for next year's delivery the inference is that most of the consumers have provided their wants for this year, and that any advance will put them in a waiting attitude. The Ohio furnaces are holding prices up to $12 furnaces for No. 2 with more uniformity and where quotations of $11.50 were obtainable last week under competition, it is now doubtful if this can be done. A central Ohio furnace has put one of its stacks in blast that has been banked for some time, feeling that the situation now warrants going ahead as orders are coming in encouragingly. We quote in carload lots f. o. b. Cincinnati:

Southern Foundry No. 1	$ 12 75
Southern Foundry No. 2	12 25
Southern Foundry No. 3	11 75 to 12 00
Southern Foundry No. 4	11 25 to 11 50
Southern Foundry No. 1 soft	12 75
Southern Foundry No. 2 soft	12 25
Gray Forge	11 00 to 11 25
Northern Foundry No. 1	13 65
Northern Foundry No. 2	13 15
Southern car wheel iron	16 25 to 16 50

Finished Material.—The volume of business among the jobbers is fairly good and there is enough coming along steadily to give this branch of the trade quite a satisfactory business. Prices have been reduced on small lots to conform with the reductions in mill prices. Bar iron is quoted at 1.35c; steel bars at 1.43c, half extras, with dealers quoting 1.60c to 1.75c for iron and steel out of store. Galvanized sheets are at 80 and 10 percent off. We quote black sheets, No. 27, at 2.25c in carlots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.60c; No. 27, 2.50c; No. 16, 2.10c; No. 14, 2c; No. 12, 1.95c; No. 10, 1.90c. Tank plates are dull and sell out of store at 1.85c for ¼-in., and 1.95c for 3-16-in., No. 8 and No. 10. Beams and channels are quoted at 1.85c from stock and angles at 1.85c to $1.90c for base sizes.

The merchant pipe situation is unchanged. The leading interest is holding firmly to the schedule while the independent mills are underselling the list. There is not a heavy volume of business moving in this line. We quote for car lots f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼ inch	69.7	53.7	67.7	51.7
⅜, ½ inch	73.7	61.7	71.7	59.7
¾ to 6 inch, inclusive	77.7	67.7	76.2	66.2
7 to 12 inch, inclusive	72.7	57.7	71.2	55.7

BOILER TUBES.

	Steel. Percent.	Iron. Percent.
to 1½ inch	41.2	27.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The market is irregular and prices difficult to establish. There is a slightly better tone, but no important improvement. Quotations represent the current level of prices. We quote:

Old No. 1 railroad wrought, net tons	$11 00 to 11 50
Cast machine and foundry, net tons	9 50 to 10 00
Old iron rails, gross tons	14 00 to 14 50
Old steel rails, gross tons	10 00 to 11 00
Old short lengths, gross tons	11 00 to 11 50
Old iron axles, net tons	14 00 to 15 00
Stove plate, net tons	6 50 to 7 00
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	3 50 to 4 00

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Oct. 4.

Pig Iron.—Buying on a liberal scale still continues a leading feature of the local market. Sales in the aggregate during the past week were larger than for the week previous, with Bessemer and basic grades most in demand. There were some good sales of foundry iron made also. The greater part of the tonnage booked called for delivery the remainder of the year, but there were several small lots taken for delivery in the early part of the new year. In some cases the latter was at an advance of 25 cents a ton over present prices, while some sales for the delivery were made at current prices. However, the transactions were too insignificant to permit of any definite conclusion as to the probable range of prices for the first quarter of next year. The majority of furnaces are adhering to their determination not to do any business for that delivery for the time being, Southern makers being most insistent in that respect. Despite the increased activity prices show no change from those which were quoted a week ago. Northern irons have a firmer undertone, and it is still possible to purchase round lots of No. 2 foundry for this year's delivery at $9.50 Birmingham. Inquiries continue to be chiefly for delivery for the balance of the year, but there are some very large inquiries in the market now for delivery the first of next year. One of these is for about 10,000 tons of foundry grades from an important jobbing foundry interest of this city. The fact is mentioned that beginning of speculative buying has appeared. New York quotations at tidewater follows: Northern No. 1 X, $14.50 to $15; No. 2 X, $14 to $14.50; No. 2 plain, $13.50 to $14; Southern No. 1 foundry, $13.50 to $13.75; No. 2 foundry, $13 to $13.25; No. 3 foundry, $12.50 to $12.75; No. 4 foundry, $12.25 to $12.50.

Rails.—The market is very quiet. No large contracts have been placed, nor are there likely to be any in the near future. Small lots come with every week but do not amount to much in the aggregate. Standard sections continue to be $28 at mill.

Finished Iron and Steel.—The structural material situation during the past week was very dull. No contracts of any importance were taken, and the immediate future holds out no great prospect. Independent companies are not exhibiting the same eagerness to take business at the expense of prices that they showed a short time ago. Railroads continue to be very meager buyers, but are expected to enter the market for considerable tonnage by the first of the new year at the latest. In plates there is a fair trade reported. Bars are in better demand also, while jobbers are improving, with prices a little firmer. New York prices at tidewater follow: Angles, 3 to 6 in. x ¼ in. and heavier, 1.54½c; beams, 3 to 15 in., 1.54½c; channels, 3 to 15 in., 1.54½c; beams, 18, 20 and 24 in., 1.64½c; tees, 3 x ¼ in. and heavier, 1.59¼c; plates, carloads, tank, 1.54½c; flange, 1.64½c; marine and ordinary fire box, 1.74½c; refined iron and soft steel bars, 1.44½c; sheets, in carload lots New York, No. 28, black, 2.30c to 2.35c; galvanized, 3.30c to 3.35c.

Old Material.—The market in general has many more cheerful features than we were able to note in our last report. Sales were larger, with several 1,000 and 2,000-ton lots changing hands, especially in old steel rails. Holders as a general rule are increasing their stocks, and values are firmer. Heavy steel scrap and old car wheels are in good demand. Prices f. o. b. cars follow:

Old iron rails	$14 00 to 14 50
Old steel rails, long lengths	11 50 to 12 00
Old steel rails, short pieces	11 00 to 11 50
Relaying rails	19 00 to 20 00
Old car wheels	11 50 to 12 50
Old iron car axles	17 00 to 18 00
Old steel car axles	14 00 to 14 50
Heavy melting steel scrap	11 50 to 12 00
No. 1 railroad wrought scrap	11 50 to 12 00
Iron track scrap	10 50 to 11 00
Wrought pipe	7 75 to 8 25
Ordinary light iron	4 50 to 5 25
Cast borings	3 50 to 4 00
Wrought turnings	5 50 to 6 00
No. 1 machinery cast	9 00 to 10 00
Stove plate	7 75 to 8 25

PHILADELPHIA.

Oct. 4.

Reports, as a rule, are more favorable and the feeling is better. The Pennsylvania and other railroads are placing some orders, but not for large quantities of equipment. The pig iron situation is unquestionably improved.

Pig Iron.—The market has developed a stronger tone. The foundry business has improved. Orders have been numerous, although not often for large tonnage. Prices show no improvement, but certainly will advance if the present buying continues. For Philadelphia and nearby points of delivery quotations are as follows: No. 1 X foundry, $15 to $15.25; No. 2 X foundry, $14.25 to $14.50; No. 2 plain, $13.50 to $13.75; Standard gray forge, $12.75 to $13.00; Ordinary gray forge, $12.25 to $12.50; Southern No. 2 X forge, rail, $13.75 to $14; Basic, $12.65 to $12.75; Low phosphorus, $17.50 to $18; Malleable iron, $14.50 to $14.75.

Finished Material.—The number of new orders is larger and specifications on old contracts are being received more rapidly. Consumers are not following the hand to mouth policy as closely as they did for a time. Plates, bars and structural material are in better demand than for several months. Prices steady and unchanged as follows: Plates, 1.63½c to 1.67½c; beams, channels and angles, 1.53½c to 1.65c, according to specifications, and small angles, 1.50c to 1.55c; bars, 1.43½c for carload lots for either iron or steel and the usual advance on part carloads.

Old Material.—Prices are firm and in some cases higher. Stocks are firmly held. We quote: No. 1 steel scrap, $12 to $12.50; low phosphorus scrap, $16.50 to $16.75; old steel axles, $15.50 to $16; old iron axles, $18.50 to $19; old iron rails, $15.50 to $16; old car wheels, $12 to $12.50; choice railroad No. 1 wrought, $15 to $15.50; machinery cast, $11.50 to $12; No. 2 light scrap (forge), $10 to $10.50; light scrap (ordinary), $8 to $8.50; wrought turnings, $8.50 to $9; cast borings, $6.50 to $7; stove plate, $9 to $10; wrought iron pipe, $11.25 to $11.75.

BIRMINGHAM.

BIRMINGHAM, Ala., Oct. 4.—The Republic Iron & Steel Co. will resume operations at its Birmingham rolling mill plant on Monday, Oct. 10, in the puddle mill and the 8-in., 12-in. and 16-in. bar mills, all on double turn. About 700 men will be employed.

A decided improvement has come over the Alabama pig iron market, and not only is there a better demand but furnace men are holding off from the market in anticipation of an improvement in quotations in the near future. The sales during the past week make a good total, the production being more than taken care of. Shipments have been up to production. The output is to be increased right along. The Republic Iron & Steel Co. has two furnaces at Thomas in blast now, and the Tennessee Coal, Iron & Railroad Co. will be making iron at two of its Bessemer furnaces this week. The new furnace of the Lookout Mountain Iron Co., at Battelle, in DeKalb county, is coming up to every expectation and the output has already reached 200 tons of iron a day, the greater part of this product being first class in quality also.

The Sloss-Sheffield Steel & Iron Co. and the Alabama Consolidated Coal & Iron Co. are limiting their selling of iron in the hope of an improvement shortly in quotations. Before the middle of October iron production in Alabama will be as healthy as before curtailment set in a few months back. There has recently been a reduction in iron stocks in this district.

The following quotations are made: No. 1 foundry, $9.50 to $10; No. 2 foundry, $9.50; No. 3 foundry, $9; No. 4 foundry, $8.75; gray forge, $8.50; No. 1 soft, $10; No. 2 soft, $9.50. There is some inquiry being received in this district from Northern and Western sections of the country. Furnacemen are confident that their entire production in the last quarter of the year is going to find a ready demand. The make during that period will show a decided increase over the past three months.

Cast iron pipe manufacturers in this section anticipate steady activity until late into next year, at least. The United States Cast Iron Pipe & Foundry Co. will begin work at once on the order received from the Isthmian Canal Commission for pipe to be used in the Panama water work system. The pipe will be manufactured at the Anniston, Ala., plant. The Dimmick and other pipe companies in this section have well filled order books and with business already in sight expect to be kept busy for some time to come. The melt for the year will be the greatest in the history of the industry in Alabama.

The strike of the coal miners in this section continues. The furnace operators are placing non-union men in their mines and are getting out more and more coal every week. The coal production has increased sufficiently to warrant the resumption of work at the three furnaces mentioned in the lead.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, NO. 150 NASSAU ST., Oct. 4.

The publication of the monthly statistics, compiled by Secretary C. Mayer, of the Metal Exchange, showing an unexpected improvement in general conditions, resulted in the market having an advance of about ½c over our last week's quotations. The statistics show that the total visible supply on Sept. 30 was 13,159 tons gainst 12,480 tons on Aug. 31, against 17,249 tons at this time a year ago. Arrivals for the month were 1,855 tons, and deliveries 2,700 tons. Stocks on hand are 1,415 tons, with 1,920 tons afloat. The London market for the week was strong, especially spot. Closing prices today follow: Spot, 28.25c to 28.35c; October, 28.20c to 28.30c, and November, 28.15c to 28.30c. London closed today with £128 17s 6d for spot, and £128 15s for futures.

Copper.—Leading interests are holding prices a little firmer than a week ago, due partly to business conditions being a trifle better. The monthly statistics show exports to have been 20,469 tons, against 24,431 tons for August. The London market during the week was slightly improved. Closing prices today follow: Lake, 12⅞c to 13c; electrolytic, 12¾c to 12⅞c; casting, 12½c to 12⅝c. London closed today with £58 12s 6d for spot and futures.

Lead.—There is nothing of interest to note, and prices for spot remain at 4.20c to 4.30c. St. Louis is slightly lower at 4.10c to 4.12½c. London advanced to £11 18s 9d.

Spelter.—Is quiet and unchanged at 5.10c to 5.20c. St. Louis is weaker at 4.95c. London is stronger at £22 12s 6d.

Antimony.—Both Cookson's and Hallett's are 7c asked. Other grades are 6c asked.

Quicksilver.—We quote $40 per flask of 76½ lbs. in lots of 100 flasks. London is £7 15s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Oct. 4.

The market is somewhat sluggish after the activity of a week ago, and is without notable interest. There is a fair demand for all metals, and prices are firm and without change. We quote as follows: Lake copper in carloads, 13⅛c, and for smaller lots, 13⅜c; casting, 12⅞c for carloads, and 13¼c for lesser quantities. Pig tin, 28⅞c to 29¼c, according to quantity. Spelter, 5⅛c to 5⅜c, according to quantity; sheet

zinc, 6c for carload lots of 600 lb. casks, and 6.25c to 6.35c for less than carload lots. Pig lead, 4.20c for 50-ton lots; 4.25c for carload lots, and 4.35c for smaller lots.

Old metals are in good demand and prices strong. We quote copper wire and heavy, 11¼c; copper bottoms, 9¾c; copper clips, 10¾c. Red brass, 9¾c; red brass borings, 7⅞c. Yellow brass, heavy, 7¼c; yellow brass borings, 6¼c. Light brass, 5½c; tea lead, 3¾c; zinc, 3.60c.

Republic Iron & Steel Co. Additions.

The Republic Iron & Steel Co., Chicago, will add a 28-inch sheet bar mill to its plant at Youngstown, O., which will be erected adjoining the present billet mill. The contract for the mill work and the auxiliary machinery, including piling machines, shears, etc., has been let to the United Engineering & Foundry Co. of Pittsburg. Filer & Stowell Co., Milwaukee, will furnish the Corliss engine, which will be of the horizontal, heavy duty rolling mill type, with cylinders 54x60.

The new department will consist of three 28-in. mills, equipped so that rails or sheet and tin bars can be rolled. The mill will be similar to that at the Ohio Works of the Carnegie Steel Co. at Youngstown and will have a capacity of 500 tons of sheet and tin bars daily or 1,000 tons of rails. The rail mill will be modern in every particular and it is intended to roll standard sections in ten passes. It is the expectation to operate the mill about half time on sheet and tin bars, making an annual output of about 75,000 tons, while the rail production under this plan would be about 150,000 tons. Of course the operation of the mill on either of these products will depend entirely on the general market conditions. Sheet and tin bars will be rolled next April, while it will be June, 1905, before the entire rail rolling equipment will be completely installed, including the cooling beds, straightening and cutting off machines.

Notes of the Canadian Iron Trade.

TORONTO, Ont., Oct. 3.—W. E. H. Carter, inspector of mines, reports to the Provincial Bureau of Mines, Toronto, from Sault Ste. Marie, Ont., that the steel plant at that point is in operation day and night giving employment to about 600 men. The output averages 500 tons of 80-lb. steel rails per day. The blast furnace is approaching completion and smelting will be commenced about the latter end of October. Supplies of iron ore and coke sufficient to last during the winter are being accumulated. The Helen mine will supply about one-third of the ore used, the rest being imported from Michigan and Minnesota. Work is being steadily and economically carried on at the Helen mine with an average output of about 1,000 tons per day of 24 hours. The ore taken out is of a grade containing 60 percent iron and low in phosphorus and sulphur.

Cornelius Shields, managing director of the Lake Superior Corporation's works at the Sault, arrived in Toronto last week. He stated that when the two furnaces were started 400 tons of pig iron per day would be turned out, which would be within 100 tons of the quantity needed for the daily run of the steel mill. Mr. Shields said he was particularly gratified with the tests to which the steel rails had been subjected. Only one rail tested out of a two-weeks' output had been broken under the drop test.

On Sept. 28 the plant of the Cramp Steel Co., of Collingwood, Ont., was formally handed over to President Currie as representative of the Northern Iron & Steel Co., Ltd. Active operations will be resumed by the latter company in November. An addition to the directorate will very shortly be made by the appointment of Dr. Stevenson, of Vanderbilt University, Nashville, Tenn., who will represent the American shareholders. The Imperial Steel & Wire Co., of Collingwood, which will be closely associated with the Northern, consuming much of its output, has extensive orders on hand, including some 12,500 rods of wire fencing.

Ground was broken this week for the erection of the new warehouse and foundry for the Pittsburg Stove & Range Co., Allegheny, Pa. The site of the new plant is now occupied by the Anshutz-Bradberry plant of this company. The cost of the improvements is estimated at $62,000.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

Officers for the ensuing year were elected at the monthly meeting of the Pittsburg Foundrymen's Association held at the rooms of the Engineers' Society of Western Pennsylvania on Monday evening, Oct. 3. The meeting was well attended, and after the election there was a lively discussion with reference to adopting ways and means of arousing more interest in the meeting. After adjournment lunch was served. The following officers were elected: W. H. McFadden, Mackintosh-Hemphill & Co., president; B. D. Fuller, Westinghouse Electric & Mfg. Co., vice president; J. S. Seaman, Seaman-Sleeth Co., treasurer, and F. H. Zimmers, Union Foundry & Machine Co., secretary. Executive committee: Wm. Yagle, Yagle Foundry & Machine Co.; A. W. Slocum, National Car Wheel Co.; G. C. Schade, Braddock Machine & Mfg. Co.; J. S. McCormick, J. S. McCormick & Co. Program committee, A. O. Backert, *The Iron Trade Review;* E. D. Frohman, S. Obermayer Co.; A. W. Slocum, National Car Wheel Co. The nominating committee consisted of E. A. Kebler, D. J. Thomas and J. L. McLaren.

Bryan Robertson, dealer in pig iron, coke and cinder, and F. N. Armour, coke sales agent for several of the leading operations in the Connellsville region, were elected to membership. The following were in attendance:

J. R. McLaren, John McLaren, Mr. Phillips, Phillips & McLaren.
B. D. Fuller, Westinghouse Electric & Mfg. Co.
Jas. Fox, H. K. Porter & Co.
R. F. Barker, Taylor-Wilson & Co.
Daniel Werhle, American Foundry & Construction Co.
R. A. Walker, *Iron Age.*
A. O. Backert, *The Iron Trade Review.*
Eugene Wentz, Seaman-Sleeth Co.
J. S. McCormick, T. E. Malone, J. S. McCormick & Co.
E. A. Kebler, G. P. Maury, J. S. McDonald, Metallurgical Laboratory.
A. W. Slocum, National Car Wheel Co.
S. D. Sleeth, John Schick, Westinghouse Air Brake Co.
E. D. Frohman, S. Obermayer Co.
H. E. Walters, Lincoln Foundry Co.
Bryan Robertson, Bryan Robertson & Co.
G. C. Schade, Braddock Machine & Mfg. Co.
W. J. Dorsey, Enterprise Foundry Co.
D. MacDougall, Pittsburg Steel Foundry.
Fred Liepold, Frank-Kneeland Machine Co.
Wm. Yagle, Yagle Foundry & Machine Co.
D. P. Thomas, Sterrit-Thomas Foundry Co.
E. A. Puterbaugh, *Railway List.*
W. H. McFadden, L. E. Dunlap, H. E. Field, Wm. Hanna, Ralph Hope, Mackintosh, Hemphill & Co.
J. S. Warne, Pennsylvania Casting & Machine Co.
F. H. Zimmers, Union Foundry & Machine Co.

Machinery Wanted.

Andrew J. Matraszek, manager of the Orscha Wire Works, Orscha, Russia, whose present address is the Inside Inn, St. Louis Exposition, would like to have catalogues and price lists of American firms making machinery for the manufacture of wire, wire nails, welded and weldless chains, shovels, forks and horse nails.

New Steel Car Order.

The Pennsylvania Railroad Co. has placed an order for 600 steel cars, half going to the Pressed Steel Car Co. and the remainder to the Cambria Steel Co., Johnstown, Pa. In addition the purchase of 200 steel coke cars is being considered. Orders have been issued to the Altoona shops to build 25 locomotives.

Activity in Steel Stocks.

The past week has been one of great activity in steel stocks. An immense volume of United States Steel Corporation stock has changed hands. On Oct. 4, when 129,800 shares of preferred and 44,400 shares of common were sold, the former reached the highest point of the year, 76¾, while common sold at 19¼. On the same day, Republic Iron & Steel preferred reached the high point, 53¼, while common sold at 11¼. Tennessee Coal & Iron sold at 49½. Stocks of the Sloss-Sheffield Co., Virginia Iron, Coal & Coke, and Cambria Steel participated in the general advance. A rumor that there is to be a renewal of the plan of conversion of preferred stock of the Steel Corporation into bonds was denied at the office of J. P. Morgan & Co. and by Judge Gary.

YARD CRANES.

BY FRANK B. KLEINHANS.

A yard for storing castings is a necessity in nearly all manufacturing establishments. Many of the crowded conditions of the erecting shop would be removed by having a convenient yard near by. This is true in both the manufacture of light and heavy machinery.

In the manufacture of light machines, a large stock of castings must be carried. Competition is keen and prompt deliveries important. A large variety of castings must therefore be carried in stock, in order that there may be no delay when an order is received for a machine.

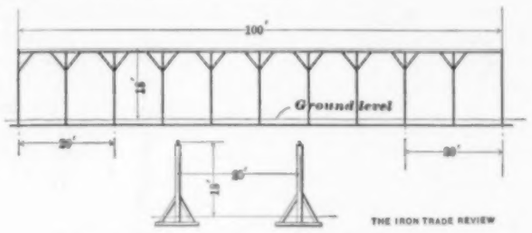


FIG. 1.—MAIN DIMENSIONS OF YARD CRANE.

In the manufacture of heavy machinery, many large castings are required for each machine and in order to facilitate work in the foundry, it is frequently a great advantage to run castings through before the machine shop is ready for them. Unless a yard is at hand, these castings must be piled up in the foundry or machine shop and thus much useful space is occupied. Any superintendent who has had to spend three hours with one or two of the traveling cranes, in order to dig out some casting at the bottom of the heap, will agree that a yard would be a useful addition to the plant.

A yard should be arranged if possible, to admit of the least amount of handling when storing castings or in removing them. Of course some overhead traveling cranes furnish the most convenient method in order that all parts of the yard can be served to good advantage.

To meet the general requirements for the manufacture of medium weight machinery, a yard crane of 6,000 lbs. capacity would be heavy enough. This crane should serve a runway of from 50 to 150 feet in length and in width from 12 to 30 feet. The cheapest support for a crane of this capacity would be a wooden structure. The crane itself should be provided with power traverse of the bridge. The raising and the lowering of the castings could be done with a hand chain block and the movement of the trolley would also be by hand.

The general arrangement of a runway for a yard is shown

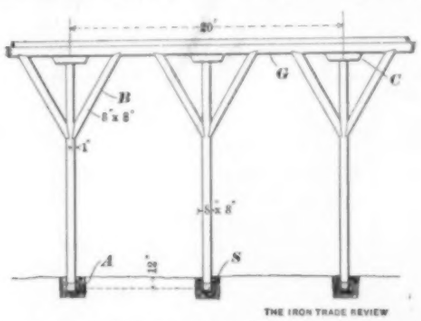


FIG. 2.—LONGITUDINAL DIMENSIONS OF YARD CRANE.

in Fig. 1. This is designed for a runway of 100 ft. in length and for a span of 25 ft. The height from the ground level to the rails would be 18 ft. The framing can be made of 8 x 8 in. yellow pine. A detail of this framing is shown in Fig. 2. The top beams G, would be spaced 20 ft. and supported on caps C as shown. The braces B would also be made of 8 x 8 in. yellow pine and would be notched both in the column and beams. The column would extend underneath the ground level of the yard and be supported on sills S. After the runway is framed together, the whole thing is leveled with stone or cinder ballast at A. This being pounded in under the sill, in much the same way as a newly laid railway track is straightened and leveled.

A cross sectional view of this runway is shown in Fig. 3. The braces B are 8 x 8 in. and are notched one inch deep as shown. If the runway can be attached to a building on one or both sides the lower braces need not be as secure as shown in this illustration.

The rails R would be put in place and the joints bolted together with fish plates. After the runway has been straightened and leveled the rails would be spiked down after the usual manner so as to give 25 ft. center to center of rail.

The arrangement of a 6,000 lb. crane is represented in Fig. 4. The hand chain block B would be hooked in the trolley link

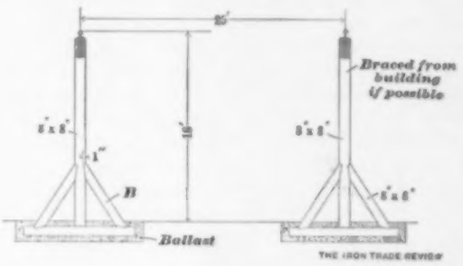


FIG. 3.—TRANSVERSE DIMENSIONS OF YARD CRANE.

as shown. The traverse of the trolley, back and forth, would be accomplished by the use of the hand chain C. The bridge would be traversed with the motor M. The racks R and R would be bolted to the rail and would extend the full length of the runway.

The following is an estimate of the cost of a hundred foot runway crane and everything complete as described:

8 x 8 in. yellow pine @ $28 per thousand	$ 118
Crane complete but without motor	475
5 h. p. motor	125
Rail spikes, bolts	56
Racks, bolts, etc.	76
6,000 hand chain block	78
Erection of runway, setting of crane, etc.	90
	$1018

This amount of money could be invested to good advantage by many manufacturing concerns which are laboring under disadvantages in their foundry and machine shop.

Six mechanical engineers from Chicago have been appointed to positions on the Panama canal commission. Some of them will act as superintendents of departments and others will be engaged as general supervising mechanical engineers. The six are: R. L. Drake, H. G. Halleck, E. C. Banta, E. C. Shoecraft, C. W. Wilson and John O. Taylor. They were

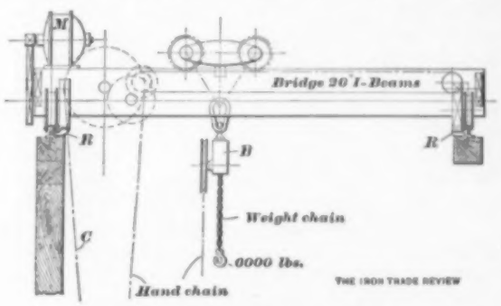


FIG. 4.—THE TRAVELING CRANE.

selected for the Isthmian canal commission by W. J. Salter, head of the western office of the technical department of the Hapgoods Co.

The repair shops of the Chicago, Rock Island & Pacific railway at Forty-seventh street and Wentworth avenue, Chicago, have been shut down for an indefinite period. All the work usually done at these shops will be performed at the company's new shops at East Moline, Ill., during the suspension.

The Monongahela plant of the American Sheet & Tin Plate Co., Pittsburg, resumed operations in full last week. The plant has been operated only in part for some time.

Organization and Equipment of the Oerlikon Construction Shops in Switzerland.

BY L. RAMAKERS.

Thirty years ago the commune of Oerlikon numbered barely 800 inhabitants and the station of Oerlikon was passed unnoticed by every traveler who crossed the Swiss frontier at Zurich-Winterthur. Today the traveler's attention is attracted by great groups of city-like buildings, and by many villas which have sprung up in the neighborhood of the little village of long ago. The development of this place, closely connected with that of the works established there in 1872, is also a direct result of them. The plant had a modest beginning and was occupied at first only in the manufacture of ordinary machines. Thanks to a painstaking finishing of the machines which were ordered, the new factory at once made a name for itself, and acquired a good patronage, which enabled it soon to make considerable extensions and encouraged it to construct the most complicated pieces of machinery. Its machine tools especially were soon sought throughout Europe, and along with this it contrived to receive heavy orders for munitions of war and complete fittings for arsenals. In 1884, after several successful additions, the Oerlikon shops commenced the study of electro-technics, and were thus among the first establishments to commit themselves to this branch of the industry. After successful trials, these shops recognized the future which electro-technics promised, and it was decided to engage in the work of perfecting systems and apparatus for the transportation and distribution of electric power, (more particularly at high voltages) as well as for lighting and traction. The ground at present occupied by the shops exceeds 32 acres, of which more than 12 are covered with buildings.

FIG. 1.—THE SHOPS AT OERLIKON, SWITZERLAND.

In order to conduct successfully operations so extended and to furnish the necessary work to the shops, a well-formed organization and one which could go into all details was the first requisite. For the various branches of the construction and manufacturing there are three technical bureaus. A special department has the general oversight and keeps the turbines, boilers and steam engines in good repair and attends to the transportation and distribution of power to the heating plants and the machine tools. Another department prepares and transmits the orders for product to the various shops. It regulates the division of the work and the general process of manufacture. The bureaus of sale and installation, subdivided according to different specialties, are in charge of the shipment of products, with the subsequent erection and installation.

The principal buildings which constitute the works are the following: The foundry, the building for cleaning the castings, the steel foundry, the carpenter shop, the warehouses for patterns, the machine shops, the administration building, the assembling departments, the boiler and tank shops, the central power station, the foundry for anti-friction metals as well as brass and copper work, the forge shop, the factory where the screws, bolts and fuses are made, the paint shop, the shipping building, the electric shops, the building for mounting switchboards and another structure for the steam turbines, with a boiler plant and an experiment and testing station as well as a number of warehouses. With the exception of a few old ones, all the buildings are brick structures covered with combination wood and cement roofs; they are 7 to 10 m. (23 to 33 ft.) high. Suitable arrangements assure efficient ventilation and good lighting. The various buildings are connected with each other and with the Oerlikon station by a net work of railroad lines of regulation track and an extensive Decauville (industrial) railway. The total length of road laid down is 9 km., (5½ miles). For the transportation of materials there are an electric traveling crane in the yard, two locomotive cranes and two electric locomotives, as well as a number of small cars. For the handling and moving of the parts of the machines in the shops there are 25 electric traveling cranes with hoisting power as great as 50 tons, and more than 50 hand-traveling hoists and jib cranes. The heating of all the buildings is accomplished from three points. There is an extensive system of water mains fed by a pumping station specially installed for the purpose, which distributes through the different shops the water necessary for ordinary purposes and in case of fire. For lighting there are about 1,400 incandescent lamps and 297 arc lights.

A part of the necessary power for the factory is taken from the Glatt river at Glattfelden and Hochfelden, at 25 and 22 km. (15½ and 13½ miles), from Oerlikon, respectively. At these points two electric central stations have been erected, with turbines which drive the three-phase current generators. At the terminals of the generators the tension is 100 volts. This is increased to 30,000 volts by transformers installed at one of the central stations, and under this pressure the power is conveyed to the Oerlikon works. The conductor cable is composed of three copper wires. Transformers at the receiving station reduce the high tension to 230 volts. Besides the 500 h. p. furnished by the hydro-electric plant, there is at Oerlikon itself an equipment of steam engines to supply the necessary additional force. This equipment consists of a battery of six boilers with a total heating surface of 635 square meters (6,833 square feet), and 5 steam engines with a total of 1,000 h. p. Among these, the triple expansion engine (600 h. p.) deserves to be mentioned (because of the fact that it is direct connected with a three-phase generator), and the electric motor equipment of a part of the works. The generator runs at 94 revolutions per minute and furnishes a current of 135 volts. This current and that supplied by the hydro-electric plant serves to feed the very extensive distributing system which carries the power to various points for use in the shops. Besides this there are in the central station two dynamos with continuous current of 200 h. p. each, which furnish the lighting current. These are operated from the principal motor shaft. For the service of the transformers, the three-phase current genera-

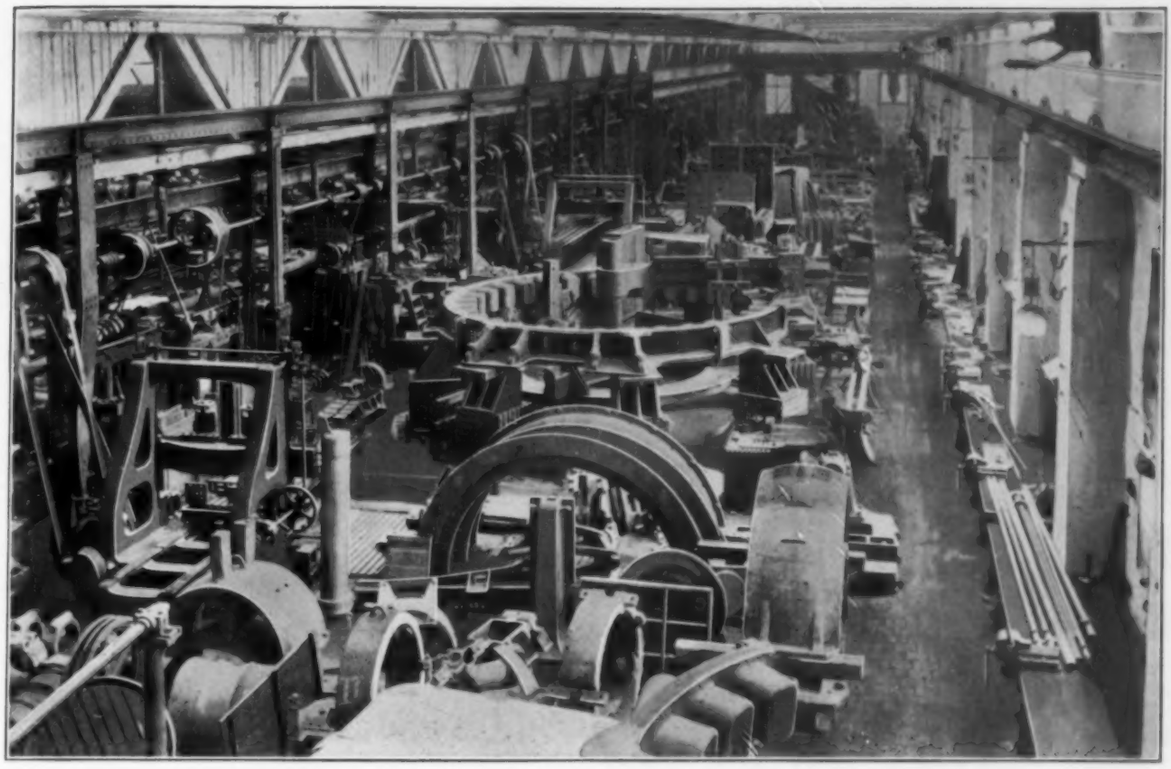


FIG. 2. — SHOP FOR HEAVY ELECTRICAL APPARATUS AND MACHINE TOOLS.

tors, the dynamos with continuous current, as well as for the general wiring, there is in the central station a complete switch board. The electric energy developed serves in part to operate, singly or in groups, the various machine tools. More than 200 motors have been installed for this purpose.

For the manufacturing departments there are twelve foundry cupolas and furnaces, twenty forge fires, six steam hammers, and 899 machine tools. Some of the latter are of very considerable dimensions, and many of them have been constructed for special work which has determined their particular uses.

The foundry covers a surface of 7,000 sq. m. (75,350 sq. ft.), it is divided into a foundry for the large castings, one for the small work and one for steel. It is traversed in several directions by regulation railroad track and narrow-gauge railways. For the handling of the pieces there are

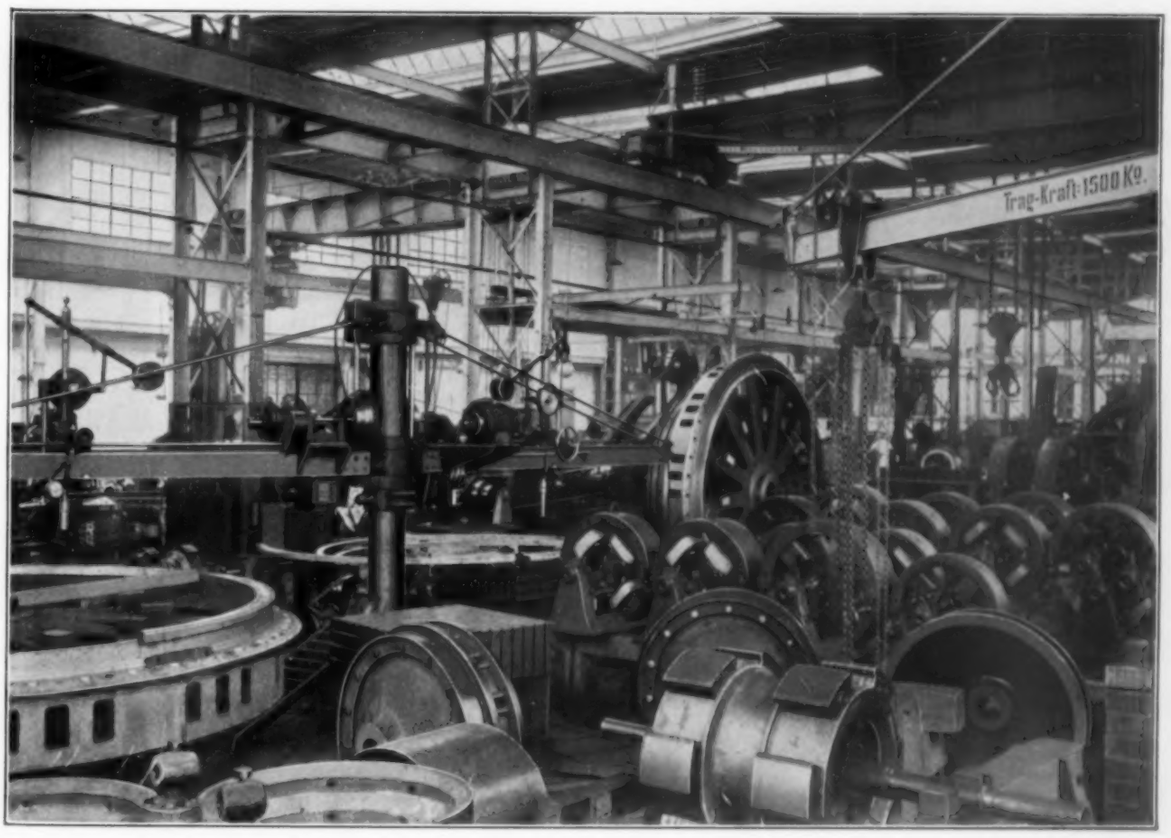


FIG. 3.—MACHINE SHOP VIEW SHOWING RADIAL DRILL WITH TWO ARMS ON THE COLUMN.

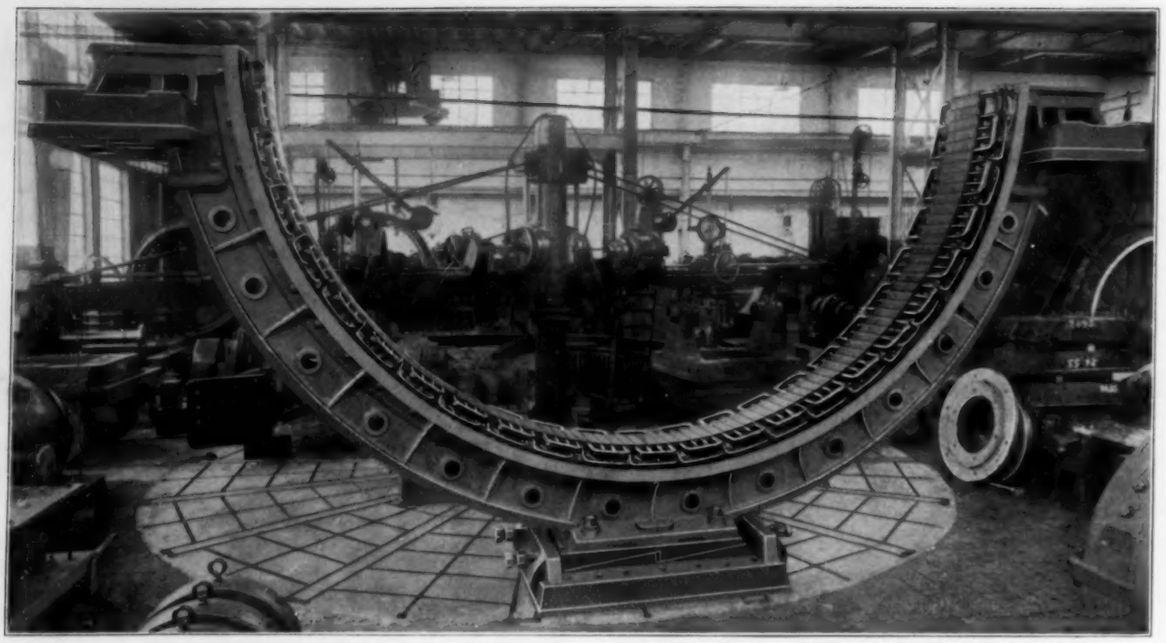


FIG. 4.—ERECTING SHOP SHOWING FLOOR PLATE ARRANGEMENT AROUND RADIAL DRILL. THE ARMATURE SECTION HELD IN FLOOR VISE IS PART OF A MONOPHASE ALTERNATING CURRENT GENERATOR OF 1100 H. P.

eight electric traveling cranes with power up to 50 tons, and a considerable number of hand traveling cranes. The rapidity and perfection of the work are increased by the use of molding machines, molding with match plates and of portable and stationary hot air furnaces for drying the molds. Thanks to these arrangements the men can work under favorable conditions. For melting the iron there are three large cupolas, one Piat furnace and one Siemens-Martin, together with a fan operated by an electric motor. The fan furnishes the blast for the various hearths. Cold saws, emery wheels, sand blast machines, tumbling barrels and a pickling apparatus serve for the cleaning and the polishing of the castings.

The machine shops combine under one roof two erecting rooms and smith shops, as well as the machines necessary for the cold-working of metals by means of planers, lathes, punches, polishing and finishing machines. The middle of the machine shop is reserved for the table of the layer out. Here all the castings coming from the foundry are scribed in order to mark exactly the places where they are to be machined. In this building, which contains several hundred machine tools, a visitor would be especially struck by the immense number of driving belts and pulleys, and with the great traveling cranes which move about the space bearing heavy loads.

The shops of the electric division are united also under a single roof, the shops for punching and notching armature blanks from steel sheets, the winding shops, the lathes for dynamos, erecting shops for motors, the shops for the large electric machines, the department for electric traction equipment, and the inspecting and testing station. In this building the attention is inevitably attracted by a machine tool of enormous dimensions used for boring the frames of the large generators, and by a lathe of no less

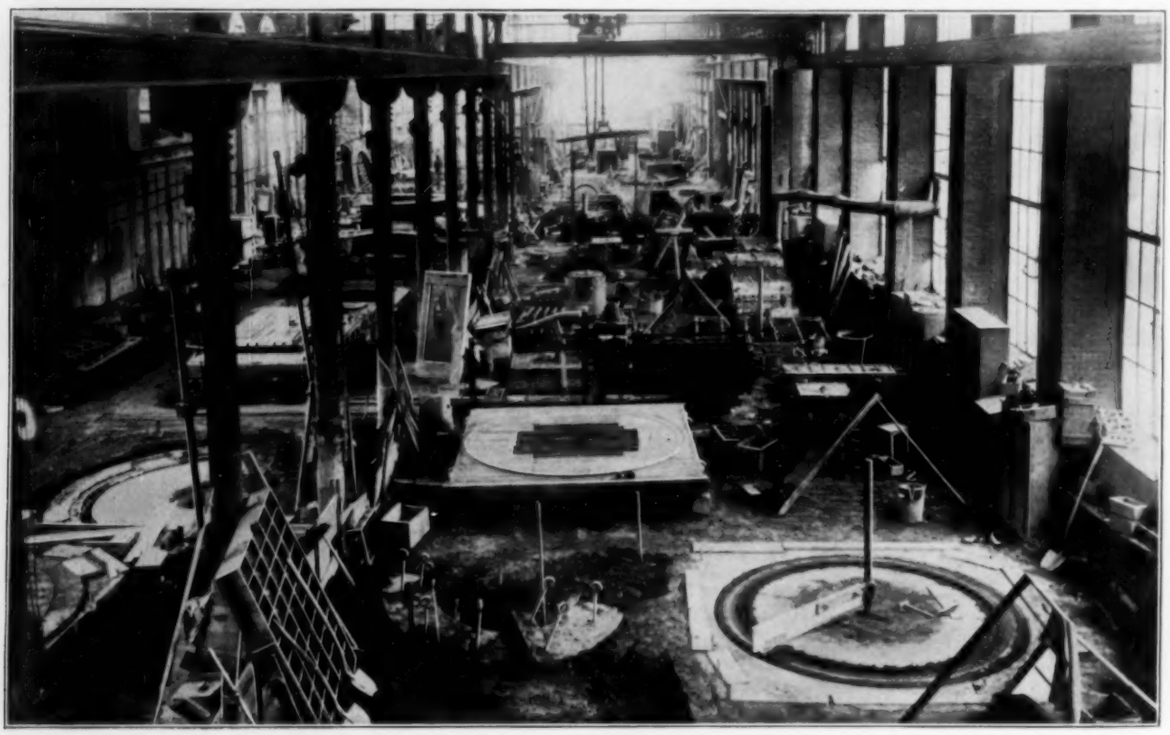


FIG. 5.—A PART OF THE FOUNDRY.

size, upon which the various castings may be machined in the position in which they are later to be installed. The visitor would certainly be impressed also by the large number of electric machines being made, whose parts sometimes reach almost to the traveling crane. The figures below will give an approximate idea of the production of the Oerlikon construction shops. The annual report gives an

FIG. 6.—TYPES OF THE ELECTRIC LOCOMOTIVES IN USE AT THE SHOPS.

account of 120,000 kg. (246,000 lb.) of bronze, copper and anti-friction metal, about 500,000 kg. (1,100,000 lb.), of steel castings, and about 3,000,000 kg. (6,600,000 lb.) of gray iron castings. The number of machine tools constructed up to date is in the neighborhood of 6,600, and more than 23,000 dynamos and transformers have been made. The sum total of the power of the machines installed exceeds 350,000 h. p. The number of shrapnel fuses made is several hundred thousand. The Oerlikon shops have constructed central stations almost all over the world. Besides this they have equipped more than 50 street and mountain railroads. Engines with a total of more than 40,000 h. p. have been furnished to electro-chemical plants.

Faithful to the principle pursued from the beginning by the administration of the company—that of extending its activity into new fields—the Oerlikon construction shops have not in these later years neglected to direct their attention to new enterprises. Thus, within two years, they have commenced the study of steam turbines, a new branch with a great future before it. Several large groups of turbo generators have been constructed, with which very detailed tests have been made, resulting favorably in almost every case.

In the domain of electric traction, also, for railways with standard track and loads, whose technical and economic problems now occupy all competent circles, the Oerlikon works have been pioneers, and, abandoning the older methods have studied out a new system of traction based on the use of a monophase alternating current.

In spite of the immense and incessant work which the shops must keep up in order to maintain their standard in their various fields of work, they have not failed to concern themselves as well with the welfare of their employés. The protective devices applied to the machines, to the motor machinery and to the apparatus for the conveyance of power often go beyond the legal requirements for protective measures in factories. The direct control of certain machine tools by electric motors is in this respect exemplary; so, too, is the arrangement of the shop for cleaning castings, where an arrangement of ventilators blows out through underground conduits the dust so injurious to the eyes and the respiratory organs. In order to discuss the various questions of labor and to preserve a contact between the management and the employés, a commission appointed by the different divisions of the shops has been instituted.

The factory facilitates the instruction of the apprentices by giving them hours of leave necessary for pursuing their studies in the complementary schools, paying them during these hours of absence. Besides this, nothing which may contribute to the moral welfare of the workmen is neglected. They have at their disposal a library, a lecture hall and an assembly room where they may spend holidays with their families.

Owing to the death of Spencer A. Jennings, formerly the senior partner of the firm of Bruce & Cook, New York, the old partnership existing between the members of this firm, has been dissolved and a new one formed by the surviving members, Philander R. Jennings, Frank C. Jennings and A. Gardiner Cooper, who will continue the business under the old name. The metal jobbing house of Bruce & Cook is the oldest of its kind in the country, having been established in 1812 by John M. Bruce on part of the same site now occupied by the firm—186 to 190 Water street and 248 and 250 Pearl street.

The Retail Merchants' Association, of Nashville, Tenn., is negotiating with the American Skein & Foundry Co. with a view to inducing it to establish a plant at Nashville, and it now seems probable that the effort will succeed. President Davidson and General Manager Mitchell, of the company, visited Nashville a few days ago and expressed themselves as much pleased with the prospects of establishing a plant in that city. Chattanooga was also visited. President Davidson stated that the company would eventually transfer its plant at Columbus, O., to the South and maintain only two plants—one in the North and one in the South.

The Foran Foundry & Mfg. Co., Flemington, N. J., has a general jobbing foundry, with a capacity of 50 tons per day. It makes castings from the very smallest up to those weighing 10 tons in the machinery line, as well as architectural castings. The company also has a line of plumbers' supplies and is the exclusive manufacturer of the Novelty sink back. President John Foran is a practical foundryman of wide experience, having been in the foundry business for the past 25 years.

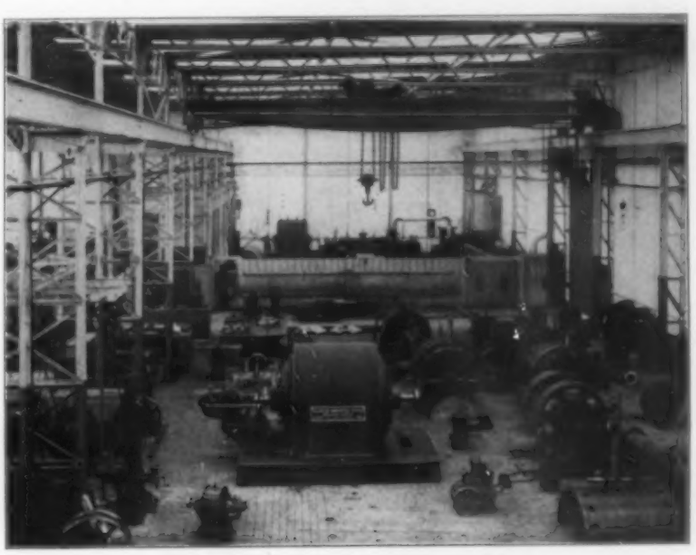


FIG. 7.—THE STEAM TURBINE SHOP.

One furnace of the Columbus Iron & Steel Co., Columbus, O., was blown in last week. The second furnace will be placed in commission as soon as the repairs are completed.

HANDLING BENZINE AND GASOLINE.

BY W. O. PLATT.

Because of its volatile nature benzine is not at all a safe thing to handle. Under proper conditions it is all right, but if one does not understand what these conditions are it is a good thing to keep away from. In *The Iron Trade Review* of Aug. 11 I saw an account of a man who went into a burning building and carried out a can of benzine, an open can. This man was spoken of as having done something that placed him in the hero class, and if he believed that the can was liable to explode the scatter the benzine around and perhaps burn him to death he certainly was a hero, even if it was not in the nature of the benzine to do that.

As benzine is getting to be used very much and as it may often go into the hands of people who do not know much about it or its nature, a little information as to how it does act under some unfavorable conditions may prove of interest. Stove and other gasolines are included in the benzines and what follows is true of them.

There have been times in the history of the oil country when benzine was of very small value. There was no market for it, and it could often be had at the small refineries for nothing. Giving it away saved them the trouble of letting it run into the creek after night to get rid of it. In those days it could usually be found around a job shop, and it was used freely to wash the grease and dirt off anything that was brought in for repairs. That is how it happened that there was a five-gallon can of it sitting near the middle of Joseph Reid's shop the night that the shop caught on fire and burned down. It is not at all certain how near full the can was before the fire, but it is certain that it was two-thirds full after the fire. It was also certain that the fire around the can had been hot enough to burn the tin coating off the can as far down as where the benzine was, and to soften the top up so that it lopped over to one side. The opening into the can was without covering of any kind. The foreman and the owner of the shop both saw and examined the can and its contents. At first they thought that there was something wrong with the benzine but a test proved that it was very ready to burn and was just as lively as any. Quite a large range of the lighter petroleum products at that time went under the common name of benzine. The more inflammable were known as light benzine, while the ones that came more nearly to the lamp oils were known as heavy benzine. It was the light benzine that was in the can and as long as the can had enough in it to be full of gas there was no danger of it exploding. It would be in the same shape that a large gas pipe full of gas would be in and we are not afraid that a pipe carrying gas will explode. The can when found was surrounded by partly burned wreckage. The floor was not burned through and this probably kept the air back from the can so that the benzine that was turned into gas by the heat was not all burned there. If it had been burning at the mouth of the can with a full supply of air it would just have burned as fast as it was turned into gas. Of course the hotter the fire became the more rapidly it would be turned into gas, but it would not explode from that cause. There would be one time when there would be danger of an explosion and that would be at the moment just before the benzine was all consumed, and with the benzine on fire it would be almost if not entirely impossible to get the proper conditions then.

FIG. 8.—THE BUILDING OF STREET CAR MOTORS.

A can that had been emptied might easily have enough left in to make gas to mix with the air in the can so as to be explosive, and if by any means fire should come in contact with the contents of the can an explosion follows.

The rule to remember is this: It is the empty can that is apt to explode. A man has been known to be seriously injured by striking a match near the bung hole of an *empty* oil barrel. Before a person takes fire around any empty vessel that has had benzine in it, he should be sure it is so empty that no gas could form. One spoonful is enough to make sufficient gas to blow up a barrel, and a vessel cannot be safely considered empty that smells of benzine. Not only is this true of benzine but it is equally true of every liquid that gives off an explosive gas, and in this class may be placed every liquid that burns freely. Many a mechanic can remember having the wick blown from a newly lighted torch, and if he will think he will remember that if he used that torch afterward he had to fill it before he could do so.

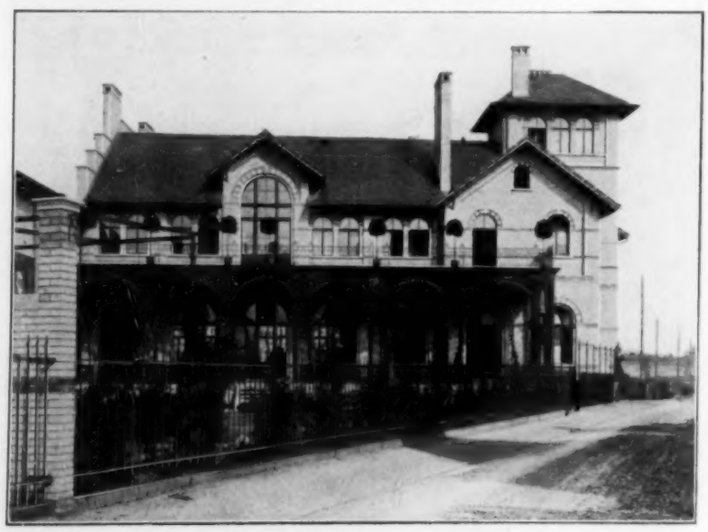


FIG. 9.—CASINO FOR USE OF WORKMEN.

To show the other side of the case, I will state that I have seen a careless man set fire to a pail nearly full of gasoline and another one put it out by laying a board over it. I was present when a man was pouring some benzine from a quart bottle and it caught fire from a gas light near it. He was pouring the benzine into a hole in a gas engine and this hole was close to the gas jet that heated the firing tube. He did not lose his head and drop or throw the bottle and so perhaps seriously burn one or more of us, but just put his thumb over the mouth of the bottle while he moved it farther from the fire. The fire went out and he was not hurt a bit. One man who made a very quick move for the door seemed to think that it was a miracle that the bottle did not explode and did not at all relish the illustrations that the man gave

to prove that there was no danger. He would slowly advance the mouth of the bottle toward the gas flame and show that the gas would go out several inches from the bottle and ignite, and also called attention to the fact that the fire was not down in the neck of the bottle but was a little bit away from it. To blow the bottle to pieces the gas and air would have to burn inside of the bottle. It does not take long for the neck of the bottle to become hot and then it is not pleasant to put the hand over the mouth of it.

In calling attention to these things I do not want to convey the impression that any of these inflammable oils should be handled carelessly under any conditions. With all of the precautions that can be thrown around them they are still dangerous. A little on the clothing may result in serious and even fatal burns, and a little in a close room may make a mixture that only needs fire to scatter destruction. The thing I do wish to make clear is that it is not safe to handle any vessel that has had benzine in it near fire or near any heat that would cause fire, neither is it safe to have an open vessel containing it in a place that is not thoroughly ventilated. It evaporates very rapidly and in a room can easily produce a mixture with the air that will explode.

There is one condition where an explosion can take place inside of a vessel that is on fire with a good supply of benzine inside. Suppose a can with the usual small mouth is about a quarter filled with benzine and is on fire. The fire will be burning outside of the mouth of the can. If now some cooling agency, as a spray of cold water, should be thrown against the outside of the can in sufficient quantity to cool the can and condense the vapor that is supplying the fire with fuel the fire would be drawn back into the can and air with it, and if the fire is not extinguished by the action an explosion is very apt to take place. This is the thing that happens when a lamp is taken from a warm room into a cold one or to an open door and explodes. In the days of poor lamp oil it was a very common occurrence for a lamp to blow up. They would often blow up when first lighted, and here the danger was in trying to light an empty lamp. With a poor gassy oil in the lamp when it was burning the space over the oil would be filled with vapor which would condense when the lamp was blown out and air would be drawn in to take its place. Now all that was needed to have an explosion was heat enough to ignite this mixture.

Remembering that benzine (and under this general head comes all the mixtures sold as gasoline) should always be handled with caution. It should also be remembered that any empty vessel that has contained it may be very much more dangerous, and should always be kept away from fire. The small neck vessels are particularly dangerous. A pail would not explode but the ordinary oil can or the barrel that has a little air vent to let air in to replace the oil drawn out is a veritable bomb.

The gasoline engine is getting to be very common and many of them use a carburetter through which air is drawn. As long as this carburetter is of sufficient size and contains enough gasoline it is safe, but if it is crowded beyond its capacity, or the gasoline is allowed to become so low in it that there is not sufficient to charge the air properly there is danger. Whenever the mixture coming through the carburetter can be used without further admixture with air it is not a safe mixture.

The Westinghouse Electric & Mfg. Co. placed six departments on double turn this week, the order affecting 1,000 men. Practically no night work has been done in these departments for nearly two years.

The Isthmian Canal Commission has awarded the contract for furnishing cast iron pipe for the water supply of Panama to the United States Cast Iron Pipe & Foundry Co., of New York. The contract calls for 43,000 tons of pipe at $21.70 per ton and the special castings at 2½ cents per pound, delivery to be at Colon.

UNIVERSAL CUTTER AND TOOL GRINDER.

The builder of the universal cutter and tool grinder here illustrated has recognized the fact that a grinder must be as far as possible absolutely rigid and free from vibration if it is to do accurate work, and special attention has been paid to attaining this end. The column as well as the knee, saddle, slide and table, are of box form with ample internal bracing and well proportioned in shape and weight. The wheel spindle frame can be swiveled to 180 degrees. The base is graduated and may be locked in any position. It is dust proof and can be adjusted to compensate for wear. All the bearings, slides and screws are covered.

The hand wheels used for adjusting purposes are of large diameter and are graduated on the outer side, reading to thousandths. The table is swiveled on a central stud and arranged for clamping in any position. It has a graduated arc in front which is divided in degrees. A scale is embedded in the slide and this reads to 3 in. taper per ft. each way. One end of the table is formed as a worm wheel segment and this engages a worm by which the table can be readily adjusted in either direction to the required taper. There is but one tool rest for all operations. This has a micrometer adjustment and can be set in any position.

UNIVERSAL CUTTER AND TOOL GRINDER.

The leading dimensions of the machine are as follows: Table movement, longitudinal 15 in., cross movement 8 in., vertical movement 7 in., swings between center 9 in. and with raising blocks will take 12 in. by 20 in. long. The machine will grind 16 in. face mills and 36 in. saws. A number of operations are capable of performance on this machine which usually require special tools, such work for example as grinding gear cutters, face of teeth in taps, formed cutters, hobs, etc. The machine is furnished with a 3 in. chuck, swivel vise, main and drum countershaft as well as a set of grinding wheels.

One of the features of the B. F. Sturtevant Co.'s new office building at Hyde Park, Mass., is the lunch room located in the basement of the building. Arrangements were first made with a caterer to furnish lunches, but the desire for home lunches became so prevalent that the company now hires the help and furnishes lunches at cost.

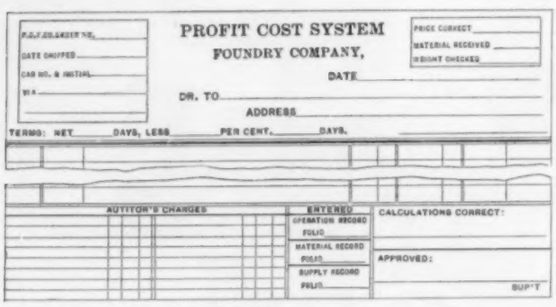
ECONOMY IN FOUNDRY COST-FINDING.*

BY JAS. C. LOUGHREY.

When we speak of economy in cost-finding, we do not mean only that which implies the least expenditure. Webster, in defining economy, says: "That management which expends money to advantage and incurs no waste; frugality in the necessary expenditure of money. It differs from parsimony which implies an improper saving of expense." To produce without finding the cost, is "improper saving of expense" and not economy. To find the cost of casting requires expense; to educate our children is also an expense, but who in this age looks upon it as unnecessary. Perhaps some children may not yield a profit on such expenditures, but that is the fault of the child or the instructor, and not the education. It may be that for some foundrymen cost-finding has not been a profitable investment, but that is the fault of the system or the one who executes it, and not the knowledge of the cost of their castings.

Economy in Knowing the Cost.

We will not confine this paper to the subject of economical methods of determining the cost of production, but to show



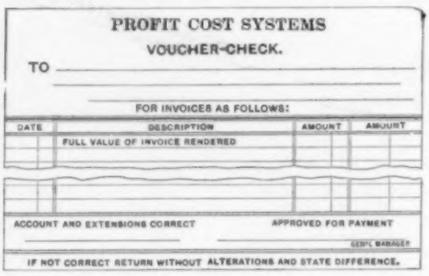
FORM A (FRONT).

FORM A (BACK).

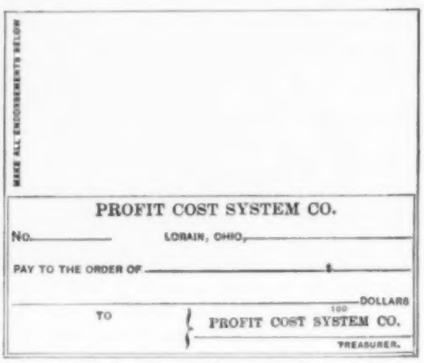
that it is economy to find definitely the cost of production, regardless of the expense involved, and endeavor to prove it to be, "that management which expends money to advantage."

A faulty system may leave you in the dark; a miscalculation may make a leak in the profits that is hard to trace. Your margin of profit is in your books, and it is not only necessary for you to know whether you are losing or making money, but to know where you are making, or if losing, to get some idea how to stop the loss. Even though making money, there may still be some leaks which, if stopped, would increase the profits. A good system of bookkeeping, properly executed, is worth thousands of dollars to you. By this we mean sales and purchase ledgers with a cost system so interwoven that with each month's balance, they produce a systematic comparison of accurate detail costs of each casting, each job or order or each class of castings, as the case requires.

The managers who look upon system as unnecessary red tape are not managers of the shops paying the largest dividends. Their systemless methods require the most of their time attending to minor details, which under a proper system would be better cared for by an assistant at $10 per week.



FORM B (FRONT).

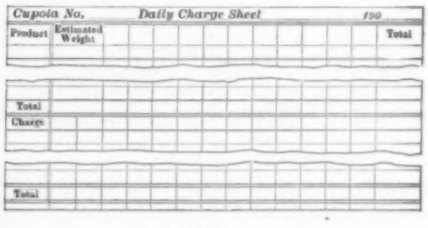


FORM B (BACK).

System has been termed "the ability to multiply ourselves in others." With this ability we have the large modern shops; without this ability, the old time establishments in which the matter of accounting has always been considered of little importance.

We may be able to keep a small business afloat without this systematic detail, but the same displacement that carries a small boat will not bear up a large vessel. If we aspire to a greater number of large prosperous foundries we must set sail to catch the breeze, systematic accounting that will waft us on. You improve and repair your riggings, put in various kinds of molding machines, etc., but your way of accounting has run on and on without oil or repairs, until the old system is breaking down under the load. In fact, if the bookkeeper asks for an extra card or form with which to patch it up, it is allowed only after considerable persuasion, and an extra clerk is not to be thought of. Why continue this "improper saving of expense?" We have our organizations for everything except accounting, why not a section for cost-finding?

Repair and improve the worn-out methods, stop the friction, and you will be surprised at the amount of power saved



FORM F.

and the ease with which your business will run. The advantages of such an organization would be many. Large corporations pay their accountants large salaries for their ability to systematize. Of course, the volume of business done by the majority of our foundries will not admit of a man of this ability at the head of their accounting, but some such method as suggested would be of assistance in the betterment of

*Read at the annual convention of the American Foundrymen's Association at Indianapolis, June, 1904.

foundry accounting, or, an organization of this kind could have in its employ a man of this ability, to assist its members in formulating better systems for the handling of their business.

Cost Systems Increase Dividends.

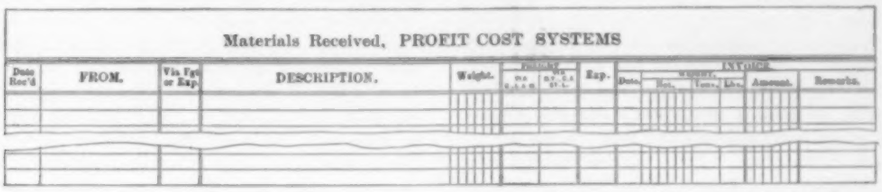
The point we have tried to make is this, that if you are trying to increase your profits by the little you can save by producing without ascertaining the cost, and just what constitutes that cost, you are working with too short a leverage; dividends are not made in that way. We are well aware that many are aroused to the need of this knowledge, but few are fully awake to the fact that the expense involved in finding the cost means an increase and not a decrease in the dividends; that every dollar so expended, by a proper system, will return to your coffers twofold. For fear we have failed in making this plain, let us relate the actual experience of an economical (?) manager increasing the dividends for his company by using and re-using old nails. It was during the when nails were selling at 90 cents per keg, that this economical manager had boys employed to gather nails out of the sand and straighten them; the molders using these in place of new ones. After reading an article showing the small fractional cost of one nail, and setting forth the fact that if a carpenter receiving $2.50 per day dropped a nail upon the ground at his feet, the value of his time, required to pick up that nail, was greater than the cost of a new nail taken from his pouch, this manager, who, by the way, was operating a shop with some 400 employes, set about to find the cost of his second-hand nails, and was much surprised to learn that he was paying three times as much for old rusty nails as new ones would cost. Needless to say, those boys were set at other work. This is but one of many similar experiences we could recite, but this simple one fully illustrates the fact that "some expenditure is economy and some economy the wildest kind of extravagance."

The Kind of a System.

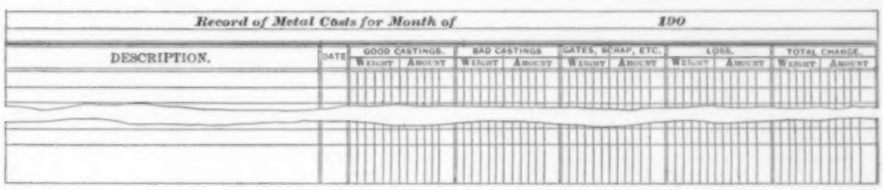
The writer has read many articles upon foundry-costing and with but one exception the subject was treated upon an estimating basis. The day of estimated costs departed in company with "large profits." The small margin of today demands accuracy and reliable detail. The costs are of small value which do not represent the exact expenditure as shown by the ledger balance; in other words, ledger balance costs. With these we not only know that nothing has been overlooked or omitted, but that no clerical errors have been made. With estimated costs there is no proof against any of these errors and no accurate profits can be based upon them.

I wish to correct the prevailing impression that a ledger balance system is an expensive one. If accuracy was required in many of the "come somewhere near" systems, the ledger balance system would in every instance require the least expenditure of both labor and money. With a ledger balance system you can not say $6 \times 4.25 = 15.50$ and never know that that job cost you $10 more than your figures represent; everything must fill out a certain place and if too much or too little, you soon find it out. With a system of this kind, the chief desideratum of every entry is to know the cost of production. Each book, form and card used have in them the threads, automatically woven into the aggregate cost, which consist of as many different colors of thread or detail as required.

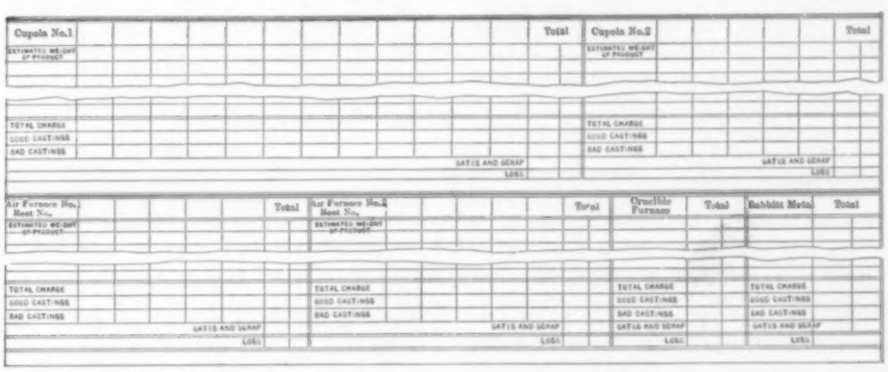
The first step towards a ledger balance cost system is the voucher method, for the handling of accounts payable; with this we include petty expenditures and payrolls, in fact, all money paid away. A voucher system can be used without a ledger balance cost system, but the reverse is not desirable. Forms A and B make a very satisfactory voucher, plain and easily understood, yet giving all necessary information. Form A always accompanies an order with a request that invoice be rendered upon the accompanying blank. This is printed in copying ink, enabling the shipper to make an impression copy for his records, thus avoiding extra manifolding at either end of the line. When received from the shipper as an invoice rendered, it shows the order number upon which shipment of material, charged thereon, was made, date, car number and route of shipment. This is first used by the buyer who checks the price, makes note of shipment upon his copy of the order on which shipment applies and inserts auditor's charges. It



FORM C.



FORM K.



FORM L.

is then passed to the receiving clerk, who checks the weight or quantity and marks date material is received. It now goes to the bookkeeper who checks the calculations and after numbering it, makes the necessary entries. It is then approved by the superintendent and passed to the stenographer who fills out a corresponding form "B" and returns both to the bookkeeper or auditor for certifying form "B." Forms "A" and "B" are now folded together and given to the general manager or president, who approves for payment form "B," which is then passed to the treasurer for payment. Form "A" is now filed away and when form "B" is returned through the bank, it is filed with form "A"; thus not only making a complete record, but also rendering it impossible for the paying away of any money without the knowledge of the proper officials. Any number of "A" forms can be stapled and made up into one voucher, cutting off at line of auditor's charges, all except the last one, which bears charges and approval for all.

A book which is a purchase ledger, voucher record, and transfer journal combined, and known as an "Operation Record," is a labor saver, and if properly designed, a very satisfactory arrangement for any foundry business. This makes a complete record of accounts payable and contains place for the detailing of the cost of the various productions. A separate ledger is required for the detailing of material in stock, that is, pig iron, coke, coal, sand, limestone, etc. Chaplets, facings and molders' supplies of all kinds should be charged to an account known as "store" or "supplies," and put in charge of some one who delivers same to molders, as required, and makes report of all such deliveries, that said account may be credited and charge made against proper job.

All pig iron and coke of course is weighed when delivered

SHOP ORDER.

Please make Lorain, Ohio,

For On their Order No.

Description,		Totals
Date made,		
No. pieces cast,		
No. pieces good,		
Description,		
Date made,		
No. pieces cast,		
No. pieces good,		

Ship to

Via Shop Order No.

FORM M.

to cupola and reported daily. Form "F" is designed for this purpose, where a variety of castings are made, requiring an entirely different mixture. The lower part instructs the cupola men how the iron is to be charged into the cupola, and the top part gives the amount and kinds of iron charged for each job or grade of castings. Where the total cast requires practically the same mixture of iron, a more simple form answers this purpose. Forms "K" and "L" are used in compiling the cost of metal, cupola loss, bad casting loss, etc.

When an order is received, a shop order, form "M," is made, and customer's order stamped "entered" shop order No. — which is then filed and ordinarily not referred to again. Upon form "M" is recorded daily the number of castings made from each pattern, and later the number which proves good. A shipping form is made in carbon at the same time form "M" is made out, ruled as to record dates and quantity of shipments made. When an order has been filled, forms "M" and "M1" are bound or filed together in numerical order. There is also a shop order card for following the work through the shop, made from the original order, for each pattern, showing the number of pieces and kinds of metal required. Form "O" is a daily record of all castings made; the information for which is received by means of the shop cards. With this record is made a carbon copy for the weigh-master's or cleaning room's report of castings.

From form "O" is secured information for forms "K," "L," "M," "N" and "P." Form "P" is designed for a molder's individual record, which by taking the average per week for each molder, as recorded by form "O"; each "P" form is printed on each side and so will accommodate the record of six molders for one year. This information could be conveniently kept in card form if preferred, but the sheet has some advantages over the card.

Form "C" makes a desirable receiving record for use in connection with forms "A" and "B." The part shown is for local receipts; a very convenient arrangement is to have one part of the book for local and another part with a little different ruling for carload receipts, instead of separate books.

The Result Obtained.

Time will not permit a thorough explanation of a ledger balance system, and we will now refer briefly to the results obtained by such a system. This can best be done by a cost sheet form "S." The number of these sheets, each to represent a different job, or product, are without limit, and can be modified to suit any class of work. Separate exhibit sheets are made for melting cost, core oven cost and general charges; showing the details for the aggregate of these charges, which are prorated over the different products. The item "general charges" embodies salaries and office expenses, laboratory, taxes, insurance, water, light and power, crane service, molder's supplies, etc. Form "T" is the final or earning statement,

PROFIT COST SYSTEMS CO.

COST SHEET for Month of

	THIS MONTH		LAST MONTH		TO DATE		LAST YEAR
	No. Pcs. / Lbs.	Avg. / Lbs.	No. Pcs. / Lbs.	Avg. / Lbs.	No. Pcs. / Lbs.	Avg. / Lbs.	
	AMOUNT	AVERAGE	AMOUNT	AVERAGE	AMOUNT	AVERAGE	AVERAGE
MATERIAL. Metal,							
Furnace Loss,							
Bad Casting Loss,							
Melting,							
Gates and Scrap Loss,							
Total,							
DIRECT CHARGES Molding Sand,							
Core Sand,							
Brick							
Accessory Castings,							
Core Oven Cost,							
Total,							
MOLDING AND CLEANING Molding Labor,							
Core "							
Direct "							
Cleaning "							
General "							
Total,							
SPECIAL CHARGES Machine Work,							
Defective Loss,							
Special Expense,							
General Charges,							
Total,							
Total Cost,							
Operative Labor,							
Total Hand Account,							

	POUNDS / Lbs.	PER CENT	POUNDS / Lbs.	PER CENT	POUNDS / Lbs.	PER CENT	PER CENT
Good Castings,							
Furnace Loss,	"		"		"		
Bad Castings,	"		"		"		
Gates and Scrap,	"		"		"		
TOTAL CHARGE,							

FORM S.

one of which is made for each cost sheet, and which you will note makes, identical with the cost sheets, a comparison with the preceding month, year to date and previous year to date.

The profit shown thereon monthly, is exactly what will be shown by the ledger at the close of the year. In fact each month is as much the close of the year, as is the twelfth month, so far as the books and the earnings have to do with it. Supplies, fuel and pig iron are inventoried whenever the stock is low and product on hand checked monthly. The proper checking out of form "T" reveals any error in billing, either in calculations or weight, or the failure to bill any shipment.

With a ledger balance system, each item, card, book, form, or whatsoever is a part of the whole and will form the grand results without any friction or commotion so long as each interested party performs his or her part, and this in itself prevents carelessness upon the part of any individual. All forms requiring the workman to perform clerical work, should be eliminated, and all entries should be so connected that no mat-

ter where you pick up a thread of information it can easily be followed to the start or finish.

The writer was recently asked for the weight of a 30-ton electric crane, which had been installed and in service for eight years. The crane of course had not been purchased by weight, therefore it would be waste of time to refer to the invoice. The weight up until this time had been of no importance or special note made of it. How shall we find it? It is wanted immediately. Oh, yes! we can get that from the receiving book; let's see; that was purchased in 1896. In referring to the receiving record, we learn that it was received upon three cars, two of which were a double load and for that reason had not been weighed. The one car which had been weighed contained a small part of the crane, but with this information, the railroad expense bill was easily located which contained the weight of the entire shipment, and within ten minutes from the time this information was desired, we were in possession of it. We only quote this instance to show what unexpected information a good system properly executed will furnish upon short notice.

PROFIT COST SYSTEMS

CAST OF _____ 190 _____

WEIGHT Good	WEIGHT Bad	MOLDER	MADE FOR	DESCRIPTION	SOLD ORDER	No. Pcs.	SHIPPED	GOOD CASTINGS Pcs.	GOOD CASTINGS Weight	BAD CASTINGS Pcs.	BAD CASTINGS Weight	CHANGES

FORM O.

Organization of the Remington Typewriter Factory at Ilion, N. Y.

BY JOHN CALDER.

This factory, which can employ a maximum of 2,000 people and turn out 1,500 new typewriters per week in addition to a large demand for parts alone, machine repairing and other services, is organized on the basis shown on the chart. The sales department—The Remington Typewriter Co.—is a separate organization with headquarters in New York and branches in many countries.

The product embraces a number of different sizes and models which, with various attachments for special purposes such as tabulators, dry goods billing, etc., etc., are capable of writing lines varying from seven inches to twenty-five inches in length in all the characters and styles of type required by many languages and the various technical branches of the same. Among the later additions are the Burmese, Armenian, Laos and Arabic characters.

Name _____ Name _____ Name _____

Class of Work _____ Class of Work _____ Class of Work _____

DATE	WAGES PER DAY	TOTAL HOURS WORKED	TOTAL NO. PCS. CAST	WT. PER DAY 1000	% BAD	DATE	WAGES PER DAY	TOTAL HOURS WORKED	TOTAL NO. PCS. CAST	WT. PER DAY 1000	% BAD	DATE	WAGES PER DAY	TOTAL HOURS WORKED	TOTAL NO. PCS. CAST	WT. PER DAY 1000	% BAD

FORM P.

"There's a vast difference," says someone, "between having a carload of miscellaneous facts sloshing around loose in your head and getting all mixed up in transit, and carrying the same assortment properly boxed and crated for convenient handling and immediate delivery."

The St. Louis Southwestern Railway Co. has filed with the County Register of Shelby, Tenn., an agreement to pay the American Car & Foundry Co. $134,138 for the building of 15 coaches, and $23,613 for the building of 20 baggage cars. The work will not be performed by the Binghamton plant, but will probably be executed at Jeffersonville, Ind. The Binghamton plant is not building coaches this year.

A reader of *The Iron Trade Review* is in the market for second-hand drop forging equipment, including trimming presses, drop hammers, helve hammer, die sinking machine, heating furnaces, etc.

As "the field is the world" and the demand constantly increasing, the calls upon the factory by the sales organization are particularly onerous and require a high degree of specialization of product and division of labor. Large quantities of nearly 2,000 different kinds of simple and compound parts are daily in course of manufacture, out of which the various types of machines are built up. The labor of the factory is classified as non-productive and productive.

Non-Productive Departments.

These embrace all the efforts, only indirectly connected with the practical manufacture of the product, which are necessary for the successful and economical running of the foundry. As shown in detail on the upper portion of the chart, the non-productive departments supply the productive with all the raw material, and instructions as to what to do with it, and receive from them in return the specified product. Likewise, they furnish, maintain and extend in an efficient condition all

PROFIT COST SYSTEMS _____ OPERATIONS, for Month of _____ 190 _____

	THIS MONTH			LAST MONTH			TO DATE			LAST YEAR, TO DATE		
	Pounds	Price	Amount	Pounds	Price	Amount	Pounds	Price	Amount	Pounds	Price	Amount
Stock,												
Mdse.,												
Total,												
Used,												
Balance,												
Sold,												
Defective Lots,												
Prices Rec'd,												
On Hand,												
Total,												
Profit,												

FORM T.

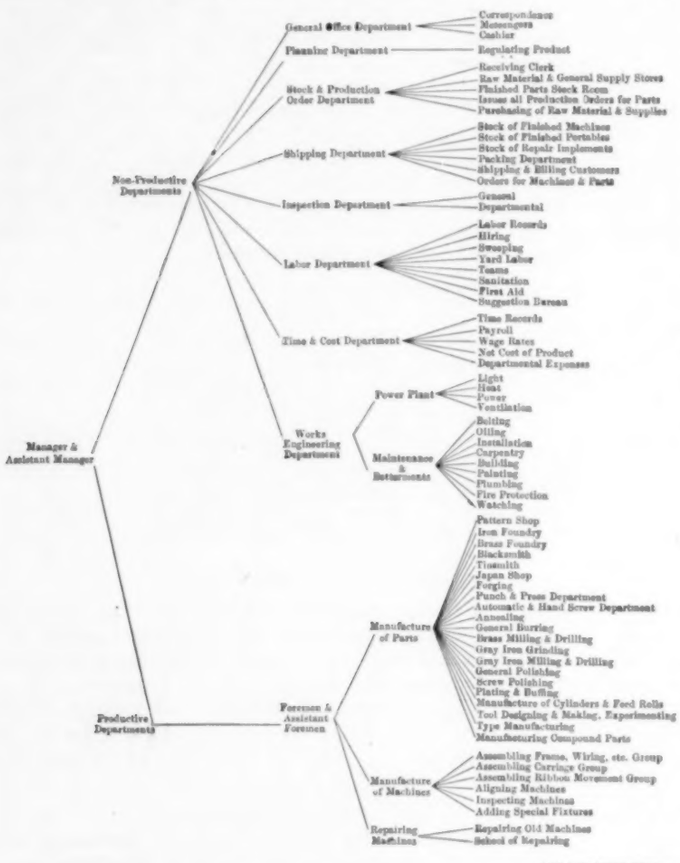
power, machinery, buildings, plant, watching and clerical labor necessary for the conduct of the manufacturing operations.

The non-productive departments are eight in number:

(1). *General Office Department.* Here all correspondence, telegrams and messages are received and distributed by phone and factory messenger-service to the various departments concerned for attention or reply. The outward mail being collected and sent away from this office also. The cashier is accommodated here and makes payments upon all invoices marked as "approved" by the stock department after the latter has received and examined the invoiced supplies.

(2). *The Planning Department* in the manager's office makes forecasts of the varying productive requirements and regulates the nature and amount of the product by instructions to the stock and productive order department. It likewise initiates general improvements in plant and organization and controls the factory policy as a whole.

(3). *The Stock and Production Order Department* is the initiating center for all purchase or issue of material and authority to expend labor thereon. No factory operations can be performed or material issued for product, upkeep, or betterments without a production order covering the same. The receiving clerk checks all raw material and general purchased supplies. These, after comparison with invoice inspection and gauging are sent to the raw material and general supplies stores where they are kept in bins on a perpetual inventory system, the "stock in hand" being always known. A suitable maximum and minimum are established for every item in the stores and requisitions on the department for renewals are issued by the storekeeper when the permissible minimum is reached. The finished parts stock room is fitted up with specially designed bins to carry and protect a minimum of two and a maximum of six weeks' stock of nearly 2,000 varieties of simple and compound parts required to manufacture the various typewriters and attachments. The department prepares and keeps up to date a catalogue giving a distinctive consecutive number and description of every simple and compound part which is manufactured in the factory. This stock, like all others throughout the factory, is kept upon perpetual inventory. It is delivered constantly from the parts factory on production orders and is drawn off by requisitions from the shipping department, the machine assembly and repair departments. It is regularly renewed, like all the other stocks, by the issue of fresh production orders when the permissible minimum is reached. The purchasing of raw material and supplies is conducted by the stock department also; all renewals being made on notification from the stores under its control that the minimum on any item has been reached. A list of authorized suppliers and contractors and the quotations, specifications and conditions is furnished the stock department by the management who periodically arrange these matters.



ORGANIZATION OF THE REMINGTON TYPEWRITER FACTORY AT ILION, N. Y.

(4). *The Shipping Department* receives direct from the factory all its finished product, other than parts—which go to the stock department, and warehouses the same as "stock of finished machines" (amounting to several thousand), "stock of finished portables" and "stock of repair implements," on a perpetual inventory as above described with definite maxima and minima for every type and variety of domestic and foreign machine. The whole organization aims, as far as possible, to manufacture only to replace withdrawals from stock; the "stock in hand" of all such product available for immediate shipment being always known. In the packing room the shipping department conducts the elaborate tying and detailed packing necessary for the safe transit of the product over great distances. In the shipping office all sales orders for finished parts, machines and other product are received and filled either from the stock controlled by it or, if special, after issuing an assembly or repair order on the machine factory for the item. The office also prepares a weekly detailed statement of the product and shipments, and preserves a consecutive record of the registered number of every machine and attachment leaving the factory and its shipping destination. It also bills all goods shipped to the sales organization and conducts all correspondence relating to shipments.

(5). *The Inspection Department* is independent of the foremanship of the factory and carries on a constant inspecting and gauging of raw material, general supplies, parts in process and after completion, and finished machines. The general inspection is devoted to forwarding production in the various shops and reporting on the efficiency of the factory routine. The department inspectors are located constantly in their several shops and pass upon all piece-work before payment is made for same. They also report the state of the large number of gauges, fixtures and jigs which are used in engineering on a manufacturing basis. A special corps of skilled inspectors are employed in the machine factory who inspect and pass final judgment upon every machine produced.

(6). *The Labor Department* records the history of every employee, prepares the half-yearly list of those entitled to participate in the bonus distribution, interviews, registers and makes necessary inquiries regarding all applicants for position. Vacancies are notified to the department by the foreman who may consult the register or recommend a candidate. A suggestion bureau collects weekly from mail boxes throughout the factory any communications relating to improvements which employees may wish to place directly before the management and all suggestions adopted are paid for. The department controls the general factory labor devoted to sweeping, yard labor, elevators, trucking, teaming and sanitation; the foreman dealing directly only with the skilled labor in their several factory departments. It is also equipped and organized to render efficient first-class service in cases of accidental injury.

(7) *The Time and Cost Department* handles the daily time cards turned in by all the workers who charge their time to production order numbers on cards of distinguishing colors for piece-work, day-work, upkeep, or betterments. The time cards checked by clock records and for extension are assembled daily under the workman's number index, being added by the comptometer at the week end for the pay roll. The pay is distributed to the employees weekly during working hours

in envelopes delivered by messenger. The productive time cards, re-distributed after pay-day in another index according to "part number," are used, as the various production orders are completed, to compare wage rates and to estimate the net labor cost of each successive lot of parts or machines. The non-productive time cards are similarly re-distributed giving cost and comparison of all upkeep and betterment operations as well as the proportion of general and special expense chargeable to each department. The time and cost department also furnishes weekly a payroll and production analysis which shows at a glance the distribution of the payroll and the product and services rendered therefor.

(8). *The Works Engineering Department* is charged with providing light, heat, power, ventilation and fire protection, maintaining the plant for same, as well as all installation of machinery and facilities and their maintenance in the factory. The department is organized and equipped to perform all its own electrical, mechanical, building and furnishing services. All departments requisition facilities which they may desire and these, if granted or if planned by the management, are allotted production order numbers and costed like the factory product.

Productive Departments.

The works are divided into two sections. By far the larger is devoted to the manufacture of parts chiefly by piece-work labor under skilled foremen and assistant foremen and checked by the system of general and departmental inspectors already referred to, who report to the management.

Experimental work is always being carried on both in design and modeling and when this is standardized, patterns are made and the necessary special tools and fixtures prepared in the tool room for manufacture on a large scale.

The foundries for iron, brass and alloys along with the raw material stores supply the material from which seventeen manufacturing departments produce the larger quantities of 2,000 kinds of parts and the immense varieties of type which are daily delivered to the stock rooms on production orders.

The works engineering department, the foremen, inspectors and management are constantly promoting the introduction of labor-saving methods and seeking to raise the already high standard of workmanship and equipment.

To promote the introduction of small economics the "suggestion bureau" mentioned under the "labor department" has been organized.

The manufacture of machines is carried on separately by piece-work labor in a large and specially arranged room in which, with mach division of labor and minimum handling and loss of time, the parts drawn off by requisition upon the stock department are daily assembled into groups and these again into typewriting machines, with or without special attachments, which are constantly passing into the adjacent warehouse and packing room.

The system of departmental inspection is carried out as a check on every assembling group, and, in addition, upon the corps of final inspectors rests the responsibility for every machine being shipped in perfect order.

The assembly department has at any time from 2,000 to 3,000 machines in process and the identifying number and description of these are kept upon perpetual inventory like the factory stocks so that any one can be instantly traced and its state of assembly ascertained and forwarded.

Repairing Machines. The great durability of the Remington standard typewriter leads to a preference on the part of some for old models and machines long used by them. To meet their requirements a department entirely separate from the new product has been established at the factory in which all types of Remington machines can be efficiently and expeditiously repaired and put in good working order by a selected corps of the best workmen. Nearly a hundred machines a week can be so handled besides the overhauling of large quantities of parts.

School of Repairing. At all the sales centers and district offices of the Remington organization there is a steady demand for all-round workmen as skilled repairers, and in order to keep up the supply a school of repairing, with a definite curriculum extending over some months and graduation tests, has been established into which capable young men are admitted on signing an agreement and are drafted to various centers after graduation as vacancies for repairers occur.

FOUNDRY AND FACTORY SYSTEMS.*

BY KENNETH FALCONER.

We hear a great deal in these days about specialism and concentration of effort, and while modern conditions have undoubtedly made these essential to any great measure of industrial success, yet, like many other good things, it is possible to carry them to excess,—to over-reach the mark. Their good effect is greatly lessened when they are combined with too much specialism of knowledge, or rather with lack of knowledge, concerning all conditions and requirements outside of the field directly worked in. In such case they are very apt, instead of being factors for success, to be a brake on the wheels. For that reason I am glad the subject for this evening is "Foundry and Factory Ssytems," not "Foundry Accounting or Cost Keeping."

At a meeting of an association such as this, the foundry is the subject of paramount interest, and in the present stage of that industry—I speak from personal knowledge of Canadian conditions only—the question of the cost of product is the essential one to foundrymen. Notwithstanding this, these two questions, cost finding and the broader question of foundry accounting can only be properly solved when considered in the light of their relation to the entire organization.

In the *Engineering Magazine* some few years ago, Mr. James Newton Gunn expressed the view that cost keeping is only—I use his own words—"a detail in the larger question of factory or industrial organization, which question must be solved before any solution of the other can be made." Any system of cost finding designed for use in foundry and planned without regard to conditions except those directly affecting cost of product—while it may supply accurate records of costs, will yet fall far short of what may fairly be looked for from it had it been designed on broader lines and as a part of a greater scheme. In cases where the foundry is but one department of productive organization, any system of accounting designed without consideration of the needs and workings of the other shops, while it may be in itself a very perfect system of foundry accounting, will yet not be the factor towards the general success which it should.

Cost Finding and Shop Accounting.

The essential difference between cost finding and factory or foundry accounting in systems lies rather in the scope of their work than in the direction of their aims. The latter includes, but is much more than, the former. The ultimate object of both is cost reduction, and both are effiecient and valuable in direct proportion as they make for that end. In the article to which I have already referred, Mr. Gunn gives the following as to what may properly be expected of a system of cost keeping:—final costs—of completed units of products at the door of the factory; final costs in which to factory costs are added all commercial and selling costs; partial costs, or costs at various stages of production; comparative costs, both of different periods, and of like articles manufactured under different conditions and indirect costs by classes and groups. Besides covering all the work of cost finding, a complete shop system should secure to the management full information as regards all the internal accounts of the business, whether such accounts represent assets or liabilities, receipts or expenditures—and details of such changes and fluctuations as these accounts may show from time to time.

The fundamental importance of specialized methods of accounting in various branches of commerce is generally admitted. Insurance accounting—bank accounting—railway accounting—are branches of the science of accounts, applied to meet special conditions. Those methods of book-keeping and of accounting devised to meet the conditions existing in foundries and factories, may be termed industrial accounting, of which cost and shop system form a most important part, thought they do not cover the whole field, or represent the entire value. Their direct bearing on the ultimate result has until recently been less generally recognized in the foundry than many other industries. This probably results from a variety of causes, but in Canada at least it is not, because profits on the manufacture and sale of castings are so large there is no need of economical production, for it is only as

*An address to the members of the New England Foundrymen's Association at Boston.

an influence towards economical production, that either cost or shop systems can justfy the outlay they necessitate.

Generally speaking, cost of product must be looked for along one or both of two main lines—either by making each individual article or group of articles manufactured the subject of individual records during manufacture, or else by finding the cost of certain operations and ascertaining the relation of that cost to such part of the product as has undergone each, either according to weight, measurement, or some other known factor. Cost finding in the foundry requires both these lines of research and record.

The Foundry Problem Complex.

That conditions existing in the foundry and the processes connected with the manufacture of its output render the problem of costs more complex than in some other lines of manufacture, is true. The general principles of cost accounting, however, apply to all productive work, and it is only in the method of their application that there is any difference between cost finding in the foundry, and in, say, a machine shop building one machine only and that always of uniform size and type. To offset the admitted difficulties in the way of finding the cost of foundry product it possesses one point which tends to simplify the question: per hundred pounds, either of the entire output, or some part of it, is the final touchstone to which must be aplied all details of the cost of castings, whether in the shape of expenditures for material, direct wages, indirect costs, or manufacturing expenses.

Foundries may be broadly divided into two classes: Those operated as a commercial organization complete in themselves, for the purpose of manufacturing and selling castings, and those forming one department of a productive organization, and part or all of whose product is supplied to other shops for further manufacture. In both cases the essential point of the system is the question of cost of product; but in the latter there are special considerations which give the problem an added importance, as directly and largely affecting the ultimate success of the entire organization. Where a foundry forms one department of a manufacturing plant, the base of a very large proportion of the finished product of the other shops will be its output. This strongly emphasizes the necessity of accurate knowledge of the cost of the castings made and which undergo further manufacture. No records can be more accurate than the data from which they are compiled, and in the case of a factory whose product is composed partly of castings of its own manufacture, records of the cost of product will be reliable in direct proportion to the accuracy of the cost finding methods employed in the foundry and the proportion of such castings entering into the composition of the finished output.

Elements in Foundry Cost.

There is another point resulting from the very nature of the industry which gives this association its name, which makes the question of cost of product of greater rather than lesser moment than any other branch of manufacture. In common with all other manufactured output, the cost of castings is composed of three elements—wage cost, that is the wages paid for its manufacture; material cost, or the cost of the material of which it is formed; and indirect cost, or expenditures incurred for the production of output not chargeable directly to the cost of individual articles or group of articles, but distributed either on all or on certain defined classes or kinds of the product. The proportion of the last named element to the total cost of product is possibly greater in the foundry than in any other line of manufacture, and it is in this element of cost almost invariably (and I think as regards the foundry I am safe in saying, always) that will be found the greatest opportunity for cost reduction. In no branch of industry does the cost of product depend less upon the question of management as regards wage and material cost, or more as regards what I have termed indirect costs. The material cost of castings is largely governed by ruling market prices, subject of course to local conditions. The wage cost is largely regulated by organizations and influences distinct from and independent of either workman or employer; the indirect cost is largely in proportion to the efficiency of the management. It is in this light that a factory or foundry system is as direct an influence for cost reduction as either an improved plant or better manufacturing methods. The latter make for increased output; the former should afford detailed knowledge and periodical comparison of all details of cost both direct and indirect, and indicate the relation between effect and cause as the ratios may change between such items. Thus it should supply the basis of judicious action making for more economical production or for lessened expenses. Systems in foundry and factory are not merely records of past results; they are guides to future action. Because the management neglect to study or fail to act upon the information they secure, it is no more reasonable to claim that they do not constitute an influence toward cost reduction than it would be to say that improved plant does not make for the same end in those formerly frequent, and still not unknown, cases where the possible increase of output is deliberately and purposely lessened or withheld.

One of the first essentials to the successful designing and installing of a factory or foundry system is careful consideration of the relative value of the results to be obtained and a clear and definite decision regarding the ends to be sought. Care regarding this point will frequently result in the elmination of some details which might otherwise be carried out at the expense of some apparently less, but in reality more, important point. Of course, as regards cost systems, the crux of the matter is knowledge of the cost of product, but here again care must be had as regards the meaning of the word "cost," even when referring to cost of product. The indirect expenses of manufacturing are frequently as much as the direct wage cost of the output and it is in this element of cost, that will usually be found the greatest opportunity for cost reduction. Up to a certain point opportunity for cost reduction is in direct proportion as the various items going to make up indirect costs or manufacturing expenses are known in detail, susceptible of analysis and periodical comparison, and, more important still, as it is possible to trace the relations between cause and effect as the ratio of any expenditure or expense to some known factor of the output may vary. For its highest efficiency, a cost system should provide complete and detailed records of those thousand and one expenses which constitute part of the cost of product and which, though possibly trivial in themselves, are of the greatest moment in the relation their aggregate bears to the output for a given period.

Methods of Reaching Results.

The ends to be sought having been definitely determined, the next step in planning a factory or foundry system should be careful consideration of the methods by which the desired results are to be secured. It will sometimes be found that a certain line of action, certain methods of work, may accomplish two or more of the ends determined upon with a very slight modification. Only recently I saw two card indexes operated in the one office, each giving entire satisfaction for the purpose for which it was planned. One was an index of factory orders for the manufacture of certain articles to supply customer's orders, and was also used as a record of costs; on the next desk was an index recording the prices charged customers for goods sold. It had never occurred to those in control to operate the one index showing both cost and selling price, which is now done with a considerable saving of time. Of course this was an extreme case, but it had resulted from adopting certain methods, to secure certain desired information for the billing department without consideration of the records already available.

Another point which makes very strongly for or against the efficiency of a cost system, is the promptness and regularity with which the information procured by it, is supplied. As regards cost of product, this will very largely depend upon conditions in each individual case. In one instance I know of, where workmen are paid each week, it is found quite satisfactory to keep the records in such shape that the cost of individual articles cannot be made up until after the end of the week in which they are finished, but this would probably not be found satisfactory where pay day only comes once a month. In another cost system I have in mind, conditions are such that the essential requirement placed before all else, was that the cost of finished articles should be known the day after they were completed. It is, however, as regards indirect cost of product and the expense of operating and maintenance, essential that results should be promptly and regularly available for examination and comparison. For instance, if the

proportion of non-productive to productive labor, of expense to output, of each shop is shown month by month, this information should be available so promptly as to admit of any abnormal change being inquired into, and the cause ascertained.

Value of Prompt Knowledge.

If I were the owner of the foundry and desirous of having presented to me full details of everything which in any degree affected the cost of output, I would, other things being equal, place a much higher value on a system which accomplishes this regularly, say on or before the 5th of the month after that to which reference was had than on one which furnished the same information any time between 30 and 60 days later. The efficiency of a shop or cost system is in direct proportion to the accuracy of its records and the promptness with which the information procured by it is available. The value of such records and information as a general rule lessens in an ever-growing ratio with each day that elapses between the close of the period or completion of the work to which they refer and the time when they are available for examination and comparison with past results and transactions, or with data of related interest.

Another important question, and one which does not always receive the consideration is deserves, is how best to arrange the information secured so as most graphically to present the conditions existing, and most forcefully indicate their cause. Many otherwise efficient systems, carefully planned and conscientiously carried out, lose much of their value because the information they secure is arranged solely with the idea of showing amounts and values without the slightest consideration of their relations, ratios, or proportions. The value of periodical reports is often sacrificed to uniformity. For instance, the amount of non-productive labor in a certain shop or of fuel consumed in the foundry, if shown in conjunction with the total labor in that shop, and with the weight of castings produced for a given period, will convey more meaning than if the same figures appear merely as details of wages, of fuel consumed, and of castings manufactured. Amounts and values should be so presented as to serve the purpose of record, and in addition to act as a guide to subsequent action or later transactions. To quote Mr. Gunn once more: "Costs have no value except in comparison, that action may be directed by experience."

The Graphic Method.

It is of course impossible to make any general rule regarding the make-up of periodical reports and statements. This will always be largely decided by individual preference and previously existing methods. The respective advantages of using parallel columns of figures, or diagrams, showing either gross amounts, or proportions and percentages, depends largely on the nature of the information recorded,—the purpose the results under consideration are intended to serve,—in what relation the study of them will be of most value, and in connection with what other information they will convey the most meaning. For instance: if the amounts to be recorded represent a fact complete in itself, as for example, the value of plant, then figures in parallel columns will serve every purpose. If it is desirable to indicate whether the tendency from month to month is towards increase or towards decrease, diagrams representing gross amounts will point this out more graphically than any arrangement of figures. Let the amount of raw and manufactured material on hand on the first of each month be thus shown and a connecting line drawn between the points indicating these values. Any undue increase in the amount invested in material will be more readily noticed than if the same information is shown by parallel columns of figures.

The value of basing curves and diagrams on proportions and percentages is evident when the meaning and value of the information to be recorded depends largely upon its relation to other items—items possibly of a different nature but to some extent dependent upon and affected by it. If the total output, say of a brass foundry, be represented by 100 and curves be used to show in proportion the number of hours worked,—the average cost in material, in molders' wages, in floor labor, in each item of indirect cost, the weight of fuel consumed, of loss in melting, of bad castings produced, and the many other items which, in a foundry particularly, vary so greatly, according to the attention paid to small matters, the statements got up on these lines may readily lead to economies, opportunities for which might not have been recognized, or may point out disproportionate or unjustified increase of expenditures which might otherwise have passed unnoticed.

To express it briefly, parallel columns of figures show results and afford opportunity for comparison. In the same direction curves based on gross amounts are of equal value, and in addition to making the differences more noticeable, they force attention to the general tendency of the results. Curves representing percentages and proportions, if properly planned and carefully executed, afford equal opportunity for comparison, are equally insistent in forcing attention to differences and to the general tendency of the results and to a greater extent than might be thought, will indicate the relation between cause and effect. It is well to remember that whether the ultimate result is good or bad, it is equally desirable that the causes producing such results, may be known that they may be developed and encouraged, or guarded against as they make for or against success.

Flexible and Expansive Systems.

Among other points to be considered and which may affect the efficiency of the methods adopted are flexibility and provision for extension. As regards the former, the best results cannot be expected at once, nor will it usually become possible to attain them without many modifications of the lines of action first planned. It is a poor system the efficiency of which cannot be increased, and the value augmented from time to time. As regards the information to be sought, while it may be well to plan it to as minute detail as it will ultimately be required, many of the less important points may with advantage be left until the main features of the system have been introduced and are working smoothly. Many a valuable system has been ruined by over elaboration, particularly at the start. It is always well to build from the ground up, to be sure the lower floors are properly designed and built before putting on the upper. Present day conditions have tended very largely to eliminate or at least to modify, the clear cut line which was formerly drawn between the work of the office and that of the shops. Factory and foundry systems are an outgrowth of today's industrial conditions and cannot be classed as strictly accounting work, or altogether executive questions. Those in control of what may be termed the productive management of many of our most successful foundries and factories fully realize the "dollar and cent" value of accurate and reliable cost accounting. From being looked upon as a means of securing records of the cost of product and a certain amount of more or less valuable information regarding the operations of the shops, it has come to be recognized as in itself a force towards economical production, a factor the efficiency of which is in direct proportion to the accuracy and detail of its work, and the effect of which is only limited by the degree to which judicious action is based upon the information it receives.

Some Lack of Appreciation.

The reverse side of the medal is the attitude of those in whose hands lies the commercial control of such organizations, and it is to be regretted that the value of specialized industrial accounting in relation to the commercial branch of management is not more generally recognized. If planned as it should be as part of a general scheme, factory accounting should emphasize as direct a force towards increasing sales as towards economy of production, and it is as legitimately its function to supply details regarding the commercial features and relations of the business as shown in the general books as to supply records concerning operations and transactions connected with the productive work. On the one, as on the other, decisions may be made or lines of action adopted tending directly and in no small degree towards ultimate success. In its relations to the productive management an efficient factory system should point out the nature of the influence resulting from each individual detail of shop management, and from every mechanical method in use;—in its relation to the commercial branch of the business, its functions should be to show at regular periods, and in greater detail than is practicable in the general books, the ultimate effect—of the thousand and one details of the work, not only of the shops

and other departments of the factory, but of every department and branch of the business.

I have tried to indicate broadly the scope of specialized accounting for industrial organizations, and the essential importance of accurate records of costs and detailed analysis and comparison of all expenditures, and to point out some of the main considerations affecting the efficiency and value of a foundry or factory system. I have not touched upon many fields in which it may be not merely a clerical recording instrument but a direct aid to the executive—not only a passive influence but an active force for good. The work of the estimating and designing department may be greatly facilitated by accurate and promptly available records, the purchasing and handling of material may both be more economically done as the result of an efficient shop system; it may tend towards better regulations of the amount or quantity of different lines of stock on hand, and thus make for more complete execution of orders, and more prompt shipments; it may be a direct aid to the selling staff by keeping it always advised as to lines temporarily sold out, or those which for some reason it is advisable to make a special effort to dispose of;—in these and many other ways it can only be of its possible value if planned as a detail of the general scheme of organization.

I have spoken of foundry and factory systems only in their relation to individual organizations. There is, however, a sense in which they are of greater importance, of wider influence, than as they may make for the success of any firm, company or corporation. It is said that "competition is the life of trade," but there are two kinds of competition. Legitimate competition based on accurate knowledge of costs, conditions, and causes may be the life of trade, but reckless competition without such knowledge, and based only on a determination to undersell competitors is the very death of industry. In direct proportion as such systems as I have tried to outline make for the substitution of the one for the other, they constitute an influence for the general industrial welfare of the community, the state, and the nation.

At a meeting of the board of directors of the National Steel Foundry Co., New Haven, Conn., last week, H. Stuart Hotchkiss was elected president to succeed Henry L. Hotchkiss, who declined re-election. The new president is the son of Henry L. Hotchkiss, and has been treasurer of the National Foundry Co. since it was organized. Other officers chosen were Frederick B. Farnsworth, vice president; Eugene Buckman, secretary, and Mirabeau Sims, manager. To fill vacancies in the board of directors, Louis H. Bristol and Eugene S. Bristol were chosen.

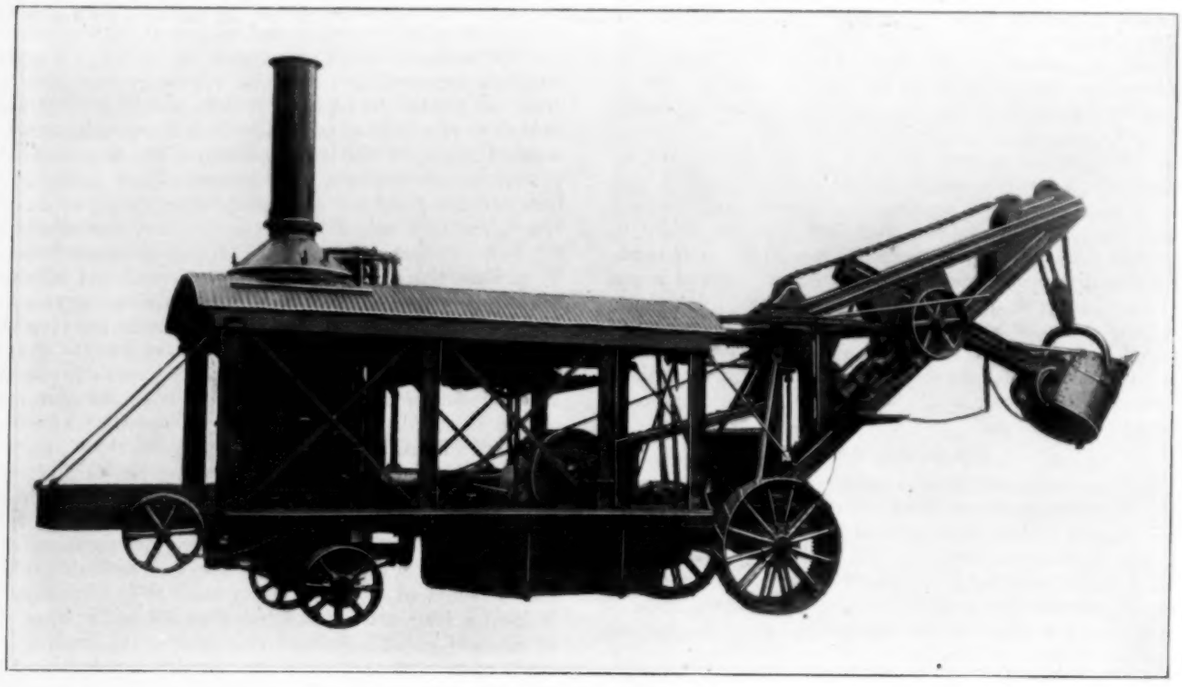
A 30-TON STEAM TRACTION SHOVEL.

The Ohio Steam Shovel Co., of Toledo, O., has a new 30-ton traction shovel with 1¼ cubic yard dipper. Improvements have been devised in the direction of greater strength, capacity, propelling power and increased maneuvering facility.

The overhang of the front end is supported by steel plates, placed edgewise fore and aft and riveted to sill beams, thus bracing the overhang effectually, and preventing any sag of the front end or a break of the sill beams. The shovel is self-propelling by means of steel gearing of new design, which enables it to climb steep grades.

The front traction wheels are five feet in diameter and made of steel. They are loose on the axle and are driven by steel rim gears, 49 in. in diameter, with 8-in. steel pinions. The propelling shaft is made in two parts, driven by a universal clutch and the wheels can be turned independently of each other, this being necessary in making short turns. The shaft is driven by a patent steel bushed chain from a steel sprocket on the main drum shaft, the whole being geared 11 to 1.

The steering gear is placed under the rear end of the car and is composed of a large rim gear and pinion connected by worm gearing and operated by a hand wheel, by means of which the rear wheels may be turned entirely under the car, until the axle is in line fore and aft, which will allow the shovel to be turned completely around within its own length.



A NEW STEAM TRACTION SHOVEL.

The axle is held in place by steel plate jaws riveted to the under side of steering ring and these allow a tilting motion in passing over uneven ground. This is a great advantage in using this steam shovel where it is necessary to turn it around in digging on different sides of a bank. This will also apply to other kinds of work, where the space is limited.

The machine is 10 ft. 2 in. wide outside measurement of wheels and 23 ft. 6 in. long. Height from ground to top of car is 12 ft. Dipper will reach 19 ft. out from center of mast and will dump 18 ft. out on either side. Will make a through cut 38 ft. wide and from 12 ft. to 24 ft. wide straight bottom. Dipper has 10 ft. clear lift above ground with door open; will cut 17 ft. high in bank and will dig 2 ft. below grade.

There are three sets of double engines, one for hoisting the dipper, one for swinging the crane, and one for thrusting the dipper. This traction shovel may be mounted on railroad trucks, when so desired, of either standard or narrow gauge, by removing the traction wheels, axles, etc., and substituting railroad trucks, bolsters, jack arms and draw bars.

The Wilkes Rolling Mill, Sharon, Pa., resumed operation Oct. 3, after an idleness of six months.

PERSONAL.

Chas. S. Buell, who until recently represented the Westinghouse Machine Co. in Chicago, has entered the employ of the Allis-Chalmers Co. as salesman and engineer in the power department. Wilbur M. Ruth, until recently assistant to the president of the Mesta Machine Co., Pittsburg, and previously on the engineering staff of the E. P. Allis Co., is now salesman and engineer for the Allis-Chalmers Co. at its Pittsburg office. R. L. Richardson is also a new member of the Pittsburg selling force. He had been in the Pittsburg sales office of the Westinghouse interests.

J. R. Houston, associated with Howard M. Hooker & Co., Pittsburg, dealers in pig iron and coke, has resigned to accept the position of secretary and treasurer of the Solid Steel Tool & Forge Co., of Pittsburg, with offices in the Farmers' Bank building. He succeeds Reuben Miller Jr.

J. R. Wemlinger, formerly engineer with the Cambria Steel Co., of Jamestown, Pa., has been appointed assistant to the New York sales agent of the Gautier department of the same company, at 71 Broadway.

C. A. Parker, who is now traffic manager of the Colorado Fuel & Iron Co., has been elected vice president of the combined system—C., H. & D. and Pere Marquette lines—effective Oct. 1.

Henry E. Pridmore, Chicago, manufacturer of molding machines, has sailed for Europe for a month's rest and vacation.

Jay C. McLauchlan, who has been with F. A. Goodrich & Co., Detroit, for the past six years, has resigned to become sales agent for Michigan of the Lackawanna Steel Co., with headquarters at Detroit. Mr. McLauchlan will also be agent for the pig iron of the Toledo Furnace Co.

George D. Evans, assistant sales agent of the Republic Iron & Steel Co. at Cleveland, started Oct. 5 for Colorado Springs, Col., where he will spend the winter for the benefit of his health.

Obituary.

David E. Whiton, inventor of the Whiton chuck and founder and head of the D. E. Whiton Machine Co., New London, Conn., died Sept. 18, aged 79 years. He was born at Stafford, Conn.; was apprenticed to a carpenter and bought himself out. He went to Chicago, but returned to work as a patternmaker at Hartford, also teaching night school. He returned to Stafford and started a shop for building a turbine water wheel of his invention. The chuck business developed later. In 1883 a branch shop was established at New London, and soon after the entire business was located there.

Hon. John F. Stairs, of Halifax, N. S., president of the Nova Scotia Steel & Coal Co., died at Toronto Sept. 26, aged 56 years. He was prominent in connection with the politics and industries of Nova Scotia and all his life had been identified with public affairs. He represented Halifax in the Canadian Parliament from 1883 to 1896. He took a leading part in the management of the Nova Scotia Steel & Coal Co. for many years and was prominently concerned in the affairs of the Dominion Coal Co.

Ira Nelson Stanley died suddenly Sept. 23 at his summer residence at Freeport, L. I., aged 84 years. He was the inventor of a furnace for desulphurizing ore and joint inventor of the Stedman-Stanley regenerative furnace. For a number of years he was superintendent of the Newport Gas Co. Newport, R. I., and afterward became a member of the Brooklyn Clay Retort & Fire Brick Works, Brooklyn, N. Y. He retired from active business about ten years ago.

The shipping yard proposed for the rebuilt plant of the National Tube Co., at McKeesport, Pa., promises to be the most extensive freight yard of its kind in the Pittsburg district. It will contain thirty tracks, and in order to carry out the plans as outlined a large amount of additional property will have to be purchased.

The Greer tin plate plant of the American Sheet & Tin Plate Co., New Castle, Pa., was shut down last Saturday for a week's idleness. Lack of orders is assigned as the reason for closing the works.

LAKE SUPERIOR IRON MINES.

There is a general complaint of shortage of labor on the iron ranges. This is particularly true on the Menominee range. At some properties on the Marquette range larger underground forces would be employed were skilled men available. Last fall and winter when many properties were closed, many miners drifted away. The copper country attracted a large number. Others, on account of low steamship rates, returned to their native lands. Farms and logging camps also extracted many. The miners are not returning and the shortage will probably be continued.

The Fayal, Pioneer and Chandler mines have increased their weekly shipments to Two Harbors nearly 20,000 tons. La Belle, Bessemer, Corsica and several other properties shipped heavily last month.

The Cleveland-Cliffs Iron Co. will bring the title to mineral rights on the Baldwin kiln road, at Negaunee, into court for settlement. The company bought the land from the city some time ago, thinking it also had bought the mineral rights, but the council has a different view and refuses to deed subterranean rights.

The Cleveland-Cliffs Iron Co. has begun building houses for employes and other preparations are being made for mining at its Austin property, Swanzy district. Well posted mining men think the iron-bearing formation in this district materially smaller than supposed to be by many people who have been locating lands.

An electric system for illuminating the underground workings of the Blue mine, at Negaunee, Marquette range, is being installed. The Blue will be the first property on the range to be equipped with an electric lighting plant for underground service.

Negotiations for sale of the old Kloman mine on the Marquette range, are in progress. The property has not been operated for more than a quarter of a century.

The Crystal Falls, Mich., representatives of the Oliver Iron Mining Co., have received orders to prepare at once to ship the ore in stock at the Mansfield mine and shipments have already begun. There are about 100,000 tons of ore in stock, but it is not known whether the entire pile will be shipped. The question whether the shipping of the Mansfield pile means the opening of the mine is being much discussed at Crystal Falls.

Supply and Machinery Dealers' Association.

We have received a copy of a call letter, which is going to interest supply and machinery dealers in the East and Central West, emanating from the office of C. B. Carter, of Knoxville, Tenn., and which it is said is to bear the names of prominent machinery dealers in Cleveland, Cincinnati, Syracuse, Chicago, Pittsburg and Boston. The letter refers to the work of the Southern Supply and Machinery Dealers' Association, and says that a similar association has been proposed for the remainder of the country. Mr. Carter is secretary and treasurer of the Southern Hardware Jobbers' Association and the Southern Supply and Machinery Dealers' Association. A meeting has been called in Cleveland on Oct. 18 and 19 to consider the formation of an association for the North, East and West and invitations are being sent to supply and machinery dealers in those sections.

Four furnaces of the open-hearth plant of the Carnegie Steel Co., South Sharon, Pa., resumed operations this week. Steel will be made by the Monell process and the other furnaces will be so equipped that steel can be made by this method.

The Pullman Co. resumed operations in its manufacturing departments at West Pullman Monday last. Three hundred workers were given employment in the sawmill and lumber yards, and this number is to be increased as the work is developed. All applicants were required to sign an agreement promising to obey the rules of the company.

At Sault Ste Marie, Sept. 30, the Chippewa Engine Works burned while the wind was blowing forty miles an hour. The plant was totally destroyed. Loss, $7,000, partly insured.

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ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

OCTOBER 6, 1904

Special interest attaches to the paper of David Baker, on recent improvements in stock distributing apparatus for blast furnaces, reprinted elsewhere in this issue, and to the description in another article, of the improved device for stock distribution designed for use at a well known Ohio blast furnace plant. The problems that have come with the high blast furnace and the fine Mesabi ores, and the severer service imposed in recent years upon the refractory materials lining the modern blast furnace, have been a constant spur to the inventive powers of furnacemen. Announcements of long campaigns on a single lining are likely to become rarer and rarer, if the performances of the past few years at well known blast furnace plants are to be repeated indefinitely. Not only blast furnace construction but blast furnace maintenance is now on such a scale of expenditure in the United States that it is not surprising British steel works directorates have stood aghast at the proposal to follow "American methods" in the building and operating of their furnaces. And on this side the revolutionary changes of the past seven or eight years have practically produced a new school of blast furnace managers.

The report that the United States Steel Corporation is planning the erection of a Canadian steel plant appears to have more basis than many of the publications relating to its movements and policy. It is known that the Canadian proposition was carefully investigated eighteen months ago, in view of the manifest advantages in supplying the Canadian trade from a well located plant on the other side of the line. The recent changes in Canadian tariff regulations, plainly aimed at the manufacturers of the United States, have naturally revived interest in the project. No doubt account will be taken in considering the advisability of this step, of the advantage such a plant will afford for the promotion of the export trade with Great Britain and in time with Australia. Whatever comes of Mr. Chamberlain's radical proposals, there is little doubt of the enactment eventually by Great Britain of tariff laws that will bear against the United States and Germany and favor the products of Canada and the Colonies. An attractive feature of a Canadian plant of the Steel Corporation, which it may be assumed would be so located as to receive Lake Superior ores and Connellsville coal directly from vessels on its docks, would be the possibility of export shipments in unbroken cargoes to British and Continental ports.

THE MOVEMENT OF GOLD.

The increased world's production of gold and its large accumulation in the United States in recent years have become factors of no little significance, bearing in an important way upon the business situation and the prices of commodities and securities. The recent figures published by the Bureau of Statistics afford some valuable data upon which to base accurate conclusions, and at the bankers' convention held in New York city last month United States Treasurer Roberts presented an interesting paper upon the state of gold and its production. The strength of our financial system is based upon our actual gold supply as well as upon our statutes, according to Mr. Roberts. This is true to a large extent, but there is some difference of opinion as to the advisability of our continuing to endeavor to accumulate gold from abroad in addition to the products of our own mines.

The world's supply of metallic gold at the present time is $5,500,000,000, of which stock the United States holds $1,342,422,740. According to the latest statistics available, the world's production in the last reported year was $300,000,000, of which the mines of the United States contributed $80,000,000. The supply of gold in the United States Treasury is, in round numbers, $700,000,000, while the banking institutions of the country hold $300,000,000 approximately. Thus it will be seen that the United States holds one-fifth of the amount of the gold in the world, largely in the hands of the Government and the banks. The increase in gold, both coin and certificates, in United States currency in five years has been slightly under $300,000,00, and in the year from August 1, 1903, to August 1, 1904, the increase was $137,727,920.

The international movement of gold in the past year has been exceptional and unusually interesting. During the month of August the importation of gold into the Uuited States was $7,761,371, against $7,848,553 during the corresponding month last year, but the exports were $10,762,818, against only $84,776 in August last year, showing an excess of over $3,000,000 in exports in August this year, as compared with an excess of $7,763,000 in imports last year. The difference is readily accounted for, however, being largely due to the continued effect of the Panama canal settlement and partly to the Cuban loan. The record for eight months reflects not only the effect of the Panama payments but, to some extent, the movement incidental to the war in the East, especially to the demands of Japan. The imports of gold for the eight months amounted to $64,450,515, against $26,455,814 during the corresponding period last year, while exports for the same period this year were $80,295,460, against $40,538,775. This period covers the time in which the largest payments abroad for merchandise imports are made and when gold is usually exported. During the balance of the year the account generally runs in favor of the United States, as during the fall exports of merchandise, especially of cotton and grain, are the heaviest. Extending the comparison over twelve months, that is, to the beginning of September this year, we

find that $19,158,878 more gold was brought into than sent out of the country, while during the corresponding period last preceding the excess of importations was $4,620,693.

According to Treasurer Roberts the supply of gold of different forms held in the United States is in the ratio of 44.9 percent to the total currency, while in Great Britain the ratio is 70 percent, in France 62.12 percent, in Germany 66.10 percent, in Russia 87.71 percent, and in Austria-Hungary 68.90 percent. In these European countries, as a whole, the ratio of gold circulation of money is 69.6 percent. From this standpoint it would appear that gold is not held in excess in the United States, a claim which is often being made.

The total circulation of money per capita in the United States is $31.06—exceeding that of every other nation in the world with the exception of France, where the amount is $39.22. The light which these figures throws on the monetary situation lends support to the contention that it is our currency as a whole that is in excess of our needs, and not the proportionate amount of gold.

It is a curious fact that in the last fifteen years we exported in gold $890,231,329 and imported $845,452,765, the excess of exports in this period being a little less than the Panama payment during the current year, but the radical changes in earlier and later periods in the movement of gold are more significant. From 1890 to 1896 inclusive each succeeding year showed an excess of exports to an aggregate of $273,961,117, but in only two years since that time—1900 anud 1903—were the exports greater than the imports. In the other years since 1896 imports were $234,484,696 in excess. The $45,000,000 excess of exports over imports in the past fifteen years is only equal to the production of our mines for seven months, or but 5 percent of the entire outward movement during the 15 years.

IRON AND STEEL EXPORTS DECREASED.

There was a rather disappointing decrease in August in the exports of rails and crude steel, the exports of steel rails being 35,631 tons against 40,300 tons in July, and of billets, ingots and blooms 28,379 tons against 35,904 in July. The total exports of iron and steel of which tonnage is reported was 156,844 tons in June, 108,035 tons in July and 101,122 tons in August. The exports of ore were 40,313 tons in July and 26,415 tons in August. The detailed exports of which tonnage is reported are as follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	August		8 mos. end'g Aug'st	
	1903	1904	1903	1904
Pig iron	1,668	1,315	10,864	27,639
Scrap	349	2,772	2,928	17,024
Bar iron	1,565	3,427	13,979	20,839
Wire rods	2,122	5,309	18,360	13,755
Steel bars (not wire rods)	650	2,435	13,252	16,513
Iron rails	4	5	143	1,387
Steel rails	371	35,631	5,124	210,321
Billets, ingots and blooms	214	28,379	1,019	236,451
Hoop, band and scroll iron	114	300	1,307	2,118
Iron sheets and plates	279	442	2,664	3,106
Steel sheets and plates	882	6,941	8,564	23,659
Tin plates, terne plates and taggers' tin	3	916	168	4,659
Structural material	1,525	5,035	20,670	31,153
Wire	7,570	5,796	70,121	72,858
Cut nails	844	532	5,730	6,595
Wire nails	2,134	1,768	20,407	18,611
Other nails, including tacks	173	219	1,468	1,873
Total	20,467	101,122	196,768	709,561

The principal importer of rails from the United States was British North America, which received 19,885 tons, while 5,468 tons went to South America, and 3,580 tons to Japan. The value of exports, excluding ore, but including machinery and other items of which tonnage is not returned, was $10,430,331 last August against $8,237,519 in August, 1903. For the eight months, the values were: $81,415,122 in 1904 and $65,341,010 in 1903.

Imports continue small and of comparatively little importance. The table on articles named follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	August		8 mos. ending August	
	1903	1904	1903	1904
Pig iron	40,475	3,841	530,972	51,943
Scrap	5,664	5,042	72,139	13,936
Bar iron	3,501	1,546	29,598	14,686
Iron and steel rails	9,347	201	85,077	34,229
Hoop, band or scroll	500	10	1,391	1,244
Steel ingots, slabs, billets or bars	20,380	705	229,680	8,201
Sheets and plates	1,200	175	6,838	3,546
Tin and terne plates	3,114	7,127	33,771	49,241
Wire rods	1,888	1,217	13,920	10,732
Wire and wire articles	393	277	3,278	2,829
Structural shapes	.....	708	.....	6,508
Total	86,452	20,849	1,006,664	197,065

The total value of imports of iron and steel, excluding ore, but including a number of lines in which tonnage is not ascertainable, was: $1,751,822 in August, 1904, and $3,440,100 in August, 1903. The values for the eight months were: $14,749,825 in 1904, $32,289,525 in 1903 and $23,456,760 in 1902. Iron ore imports were 3,841 tons in August, 1904, and 40,475 in August, 1903.

Resumptions at Homestead.

(Special Telegram.)

PITTSBURG, Oct 5.—The entire Bessemer department and the 33-inch mill at the Homestead Works of the Carnegie Steel Co. will resume full time on Sunday evening. The 84-inch mill, now operating single turn, will be placed on double turn at that time.

New Pittsburg Engineering Enterprise.

(Special Telegram.)

PITTSBURG, Oct. 5.—The Pittsburg Engineering Co., of Pittsburg, is erecting a new plant at Butler, Pa. The first building to be erected will contain the foundry and machine shop and will be 100 x 300 feet. The principal members of the company are H. B. Redding, G. P. Thurber and A. L. Schultz. About $200,000 will be invested.

The *Electrical World* in reviewing the inventive work of the late E. K. Adams mentions one interest to draftsmen. "Every one accustomed to drawings knows how unsatisfactory the universal method is of fastening the drawing paper to the drawing board by thumb tacks. The Adams device for replacing thumb tacks consists in placing grooves or pits near the edges of the drawing board and leading these out through tubes in the wooden back braces to a nipple or pump connection at the edge. After the paper is laid in correct alignment on the board, a hand pump is connected to the nipple and a partial vacuum created in the troughs, whereby the paper is lightly clamped in position until the vacuum is removed by the admission of air to the grooves."

At the meeting of the directors of the American Car & Foundry Co., held in St. Louis Oct. 3, the usual quarterly dividend of 1¾ percent was declared. The earnings for four months, May, June, July and August, were shown to be $817,000 and for the quarter a little over $600,000.

The Inland Steel Co., Indiana Harbor, Ind., resumed operations Oct. 3. Former employes, who to the number of 500 went on strike four months ago, were taken back at the scale prevailing before they stopped work. The plant will be run as an open shop.

The Labor Situation.

TIN PLATE WORKERS GIVE UP UNION CHARTER.

The tin workers employed in the Pittsburg and New Kensington tin plate mille of the American Sheet & Tin Plate Co., New Kensington, Pa., have surrendered their charters to the Amalgamated Association and have petitioned the officials of the company to place these plants in operation. They have decided that they would accept the scale of wages in force in the Demmler tin plate mill, which is not controlled by the Amalgamated Association. President Shaffer has taken the stand that the company has no right to pay these men any wages other than agreed upon during the present scale year, inasmuch as the scale signed included these mills. On the other hand the men insist that they have broken away from the association and that the latter cannot control their future actions. The point raised is an exceedingly interesting one and nothing can be learned with reference to the stand that the officials of the American Sheet & Tin Plate Co. will take. These mills have been idle for many months and as an inducement to place them in operation the men have taken this action. It is also reported that the Star plant at Pittsburg will in all probability be removed to New Kensington, but nothing definite has yet been decided upon.

LAW ENFORCEMENT IN CHICAGO LABOR TROUBLES.

Commissioner W. P. Eagan, of the National Metal Trades Association is thus quoted by Chicago newspapers in refutation of the charge that the authorities, of that city do not afford protection against lawlessness in case of strikes:

"Chicago has been maligned and abused. The charges so freely made on all sides that lawlessness and disorder are tolerated by the authorities, especially in connection with strikes, are wholly false. It is the proper thing to say all the bad things of Chicago. It has been the custom to hold the city up as the hotbed of labor turbulence and the place where all manner of excesses are committed. So often have the charges been made that the outside public has come to the conclusion they are true. As a matter of fact, I can name any number of cities in the country where laws are disregarded and rights of individuals ignored with an impunity unknown in Chicago. I know of no place where 'sluggers' are pursued and punished as they are here. No city administers its police with better effect to preserve order where disorder follows a strike. To illustrate my point, let me refer to Quincy. The machinists' union called a strike at the shop of the Quincy Engine Works eighteen months ago and the mayor gave permission to put up a tent on public property adjoining the plant for the accommodation of the pickets. The strike spread to another shop and there the union erected its picket tent in the public highway. One of these tents still is standing.

"A few years ago there was a feeling among manufacturers of machinery that Chicago was no longer an advantageous city for the location of their plants. This feeling is disappearing and, I believe, soon will go altogether. The improved labor conditions and the correct attitude of the police are making the city the safest and best of manufacturing centers."

METAL TRADES ASSOCIATION NOTES.

Judging from advices received at the commissioners' office there will be a full attendance at the next meeting of the administrative council, which will take place in Cincinnati Oct. 27, 28 and 29. Immediately preceding this meeting there will be a meeting of the plans and scope committee.

The regular monthly meeting of the New York Metal Trades Association will be held Oct. 13, in the rooms of the association at 2 o'clock. Subjects of much importance will be discussed and acted upon.

The strike in the W. & A. Fletcher Co.'s shops continues in spite of the fact that there are a very large number of boiler makers out of employment.

George M. Cooper has tendered his resignation as secretary of the Manufacturers' Association of Pittsburg.

The strike of the Damascus Bronze Co., Pittsburg, is practically off and the works are now being operated without any disturbance.

Commissioner W. P. Eagan, of the N. M. T. A., leaves the latter part of this week for an extended tour through the East. He will attend the various meetings of the local metal trades associations in Massachusetts, Connecticut and New York.

The strike at the National Elevator Co.'s plant at Honesdale, Pa., is practically over and the shop is running to its normal capacity without any disturbance.

Judging from reports received from various Chicago members, it would appear that their recent strike had the effect of increasing the quantity and quality of output.

THE CINCINNATI IRON MOLDERS STRIKE.

The officers of the National Foundrymen's Association, located at Cincinnati to look after the interests of their members, express themselves as entirely satisfied that it will not be long before they will have the foundries again at work as "open shops." Two foundries are now running with non-union men—the I. & E. Greenwald Co. and the Eureka Foundry Co. Another riot was threatened at the Eureka foundry on Saturday afternoon, but an adequate police detail was sent to the scene promptly and serious trouble was prevented. There were, however, several arrests. The employers have secured five injunctions against the picketing of the shops. The molders' union is enjoined from picketing the shops of the Eureka Foundry Co., Chris Erhart, I. & E. Greenwald, the Buckeye Foundry Co. and the Newport Iron & Brass Works. One foundry, not a member of the association, has signed an agreement with the union molders and has gone to work again, but this is the only indication of weakening on the part of the employers.

LABOR NOTES.

The Passaic Steel Co.'s employes, Paterson, N. J., have returned to work, having agreed to accept the reduction of wages proposed by the company. President Fairchild told the committee of workmen that the company would pay all employes for over time, that there would be no Sunday night work and that when conditions permit the old scale will be restored. About 1,200 men are employed at the works.

The general strike of employes at the American Tube Works, Somerville, Mass, which was started four months ago in support of a demand for $1 a week additional pay, has been declared off. The company made no concessions.

The 1,000 employes of the Passaic Steel Co., Passaic, N. J., have been notified of a general reduction in wages, ranging from 10 to 20 percent. The men employed in the electric crane department refused to accept the reduction and their plcaes were filled by other men. The other employes have taken no action and are at work.

The strike of the union car repairers at the car works of the American Car & Foundry Co., Terre Haute, Ind., which had been on since March 11, has been declared off by the union. The men struck against the piece work system and lost. They returned to work on the scale offered by the company.

Until this week there has been no trouble of a serious character at the Westinghouse plant in Cleveland, at which a strike has been on for the past eight months, but on Tuesday an exciting battle occurred between a non-union molder who was assaulted by eight men, when he was on his way home from the Westinghouse plant. The non-union molder was badly beaten with fence pickets and assaulted with bricks and stones and replied by firing a revolver a number of times. No one was hit by the bullets, and the non-union molder, although unconscious when found, will recover.

Employes of the Terre Haute plant of the American Car & Foundry Co., have decided to accept the company's wage scale.

The union machinists who have been on a strike at the Illinois Steel Co.'s plant at South Chicago, have returned to work.

The strike of boilermakers on the Erie railroad was declared off last week and the men returned to work Oct. 3.

Reports of the arrangement of a conference between the officials of the Carnegie Steel Co. and the Amalgamated Association to discuss a settlement of the strike at Girard and Youngstown are officially denied. Officials of the Carnegie Steel Co. have neither asked nor granted a conference. Little trouble is being experienced in the operation of the mills and the strike has been practically won by the company.

The union structural workers employed in the erection of the Driggs-Seabury Ordnance Co.'s plant at Sharon, Pa., struck Oct. 4, claiming that non-union men had been imported from Butler and Pittsburg to work.

THE FOUNDRY IN MAGAZINE LORE.

The foundry is not often celebrated in the popular magazines; nor do molders often figure as producers of approved magazine literature. Yet Benjamin Brooks' article on "The Molders" is the feature in *Scribner's* for October, and both artist and writer have invested the subject with a charm not suspected of lurking thereabouts. Benjamin Brooks has certainly been able to infuse the real foundry spirit into his story, as the few random extracts given below will indicate:

In another place lay the long fin-like blade of a ship's propeller, varnished and polished like a piece of furniture; and a painstaking old workman bent over the impression of it which he had taken in the earth, smoothing it with a tiny trowel, dusting it over with sprinklings of plumbago, and polishing it with the flat of his rough hand till it looked as smooth and glossy as an ice pond. Beyond, in a deep pit, a crouching gnome with a short clay pipe in his mouth was building up a circle of bricks like a well-curbing, stuffing mud and straw into the chinks, lining it with earth carefully smoothed and polished. This was to give shape to the engine cylinder of some gallant liner of the near future. In another department men were compounding unusual shapes out of flour and clay and water mixed together and pressed into wooden forms, which they piled upon a car and ran into an oven as big as a small cottage, till they were baked hard. And these "cores," as they called them, were to be laid within the sand molds to form the inside hollow places in the iron where required. So upon every side things were happening at the same lively rate, and from the great variety of the limbs and skeletons of future machinery that lay about, I concluded the foundry was the beginning of all things metallic—and this was not so very wide of the mark; for to go into a foundry is to go back to first principles in mechanics, where the ordinary common things we use and depend on every day, with no thought of their origin, are fashioned out of the elements of the earth. * * *

At high noon, which was announced by hitting a cracked bell with a hammer, we repaired by ladder to the roof of the low building, there to bask in the sun (which we had not seen before that day) and counteract the morning's gloom. While I devoured my sandwiches, finger marks and all, with a mighty appetite, Mike reached over into a neighboring yard and plucked a crisp climbing morning-glory. Holding the delicate blossom up for my inspection, he said: "Young feller, kin you make me one just like that in bronze?" I was quite sure I could not. "But," said he, "you needn't think it can't be done. First you get an old can, punch a hole through the bottom of it with a nail, and stick the stem of the flower through, leaving the blossom inside. See?" I saw. "Next you fill the can with water and drop into the water, bit by bit, nice fine sand. Mind you go slow. After a long time the water will leak out, leaving the blossom buried in the sand, but still in good shape. Now you'll dry the whole thing in the core oven and bake it. That will burn the blossom to ashes. Then if you have the patience to shake it and shake it till all the ashes drop out through the stem, you'll be ready to pour in your metal; and if you do as I tell you and make no mistake, and try about six times, you'll have, in the end, the prettiest morning-glory that ever blossomed in a tomato can." * * *

I worked many months at the molders' trade, but never learned it. For that matter, neither had my instructor, Mike, who had been at it years and had the advantage of a long line of molders to inherit from; and his white-haired grandfather, crushed to death by the crane through a mistaken signal at the age of ninety, had never learned it either. He had often said to Mike, viewing with grave disfavor the introduction of machinery into the trade, "The day will come, my lad, when you'll be ashamed to say you're a molder!" And all good mechanics are apt to feel that machinery takes the skill out of a trade and reduces it to drudgery. Yet here was I, working in what may prove the world's climax of machinery, and molding was still an intangible, unlearnable art; and, as in the time of Mike's distinguished ancestor, so there are today about nine men out of ten who could never be good molders any more than they could paint good pictures or sculpture in clay. Indeed, it is very hard to say where the molder leaves off and the sculptor begins. There is, to be sure, a lot of humdrum about it. A man will often be found making twenty molds a day from the one pattern, and doing the same for months together, till his tools wear out in his hands. He works automatically, without zeal or joy in the task, and whether the monotony makes the man or the man chooses the monotony is not easy to say. Most of them, at any rate, fight against routine. They roam over the map with a happy-go-lucky assurance of a job, appear in many shops, do many different kinds of work, until they have become too valuable to set at one task to work without thought. Delightfully free and sailor-like it is to go where one will, seeing the cities of the world like a gentleman tramp, with one's office under his hat, with one's livelihood in one's hands, and money in pocket. Yet I believe the artist rather than the vagabond is uppermost with them. We took on a man one day who gave us a most convincing reason for having left his last job. It was this way: he was molding large grooved pulleys for a cable railway. Some were cast, others he was at work on. At this point a surly foreman ordered him to "shake her out"—which meant to destroy the mold. Now why should he "shake her out?" The first pulleys were good, why not these? He had made no error. The foreman offered no explanation, but, with a sneer of disapproval, ordered the molds destroyed. The purely materialistic view of the situation would have been—so many dollars per day, whether the work might be to build up or shake out; but our new man saw only that he asked to destroy without good reason the work of his own skilled hand; and, sooner than do that, he put on his coat, demanded his pay, and set out for new worlds to conquer. There is usually room at the top for all such "unphilosophic" molders as he, for in contrast with the twenty-pieces-a-day routine is the work that requires great skill and judgment—like the ocean greyhound's cylinder, for instance, that takes two weeks to make; and beyond that again are the fellows that cast the great chimes—five tons of metals in one bell, mixed and compounded with the care of an alchemist, true to the ear and without a single flaw. The bronzes on the Capitoline, the satyrs that were dug up at Pompeii—these also are molding; and old Bartolommeo Colleoni, riding his famous bronze steed through the square in Venice, is enough to make every molder proud of his trade. It is a very ancient, respectable art, and has never declined like many others * * *

And their reputation for brute unruliness: a molder is apt to turn devil when he strikes. A little scrap of cold iron dipped in water and dropped into a filling ladle will explode it like a Yellowstone "hell-hole," blinding, or maybe killing, everybody near it; and a handful of gunpowder dropped down a "gate" will never show till the metal touches it off when the mold is poured. It is a brave man indeed who will risk his life as a "scab" in a foundry. Yet in contrast to such occasional inhumanity are the weekly gatherings in sombre meeting halls decorated with florid banners, mediæval regalia, and spittoons, wherein the grievances of the hot-headed are allowed to dissipate in smoke, profanity, and chaotic argument; and the business element refers the matter to headquarters in Cincinnati, waits calmly for the decision of the central committee, and acts upon their yea or nay with the support of 50,000 men.

At the annual meeting this week of the stockholders of the American Steel Founders the retiring board of directors was re-elected, with the exception that P. K. Neidringhouse was elected in place of S. R. Callaway, deceased. President Miller, in his address to the stockholders, stated that the company suffered by the reduced commercial activity of the past year in common with all other industrial enterprises to such an extent that the gross sales for the year ended July 31 were 46 percent less than in the preceding year.

The Monongahela tin plate plant of the American Sheet & Tin Plate Co., Pittsburg, will be placed in full operation on Monday, Oct. 10. It has been idle for some time, the continuous tin rolling machinery undergoing extensive repairs.

At Phillipsburg, N. J., Oct. 1, the main building of the American Sheet Iron Co.'s plant was destroyed by fire. The loss is placed at $100,000, covered by insurance.

NEW BOOKS.

"Tonnage Conversion Tables" is the title of a cloth bound book of 155 4½ x 6-in. pages. The tables have been arranged for the purpose of rapidly converting pounds into their equivalents in tons and fractional parts of a ton and are equally useful in the conversion of tons and fractional parts of a ton into pounds. The book will also serve for finding the value of tons and parts of a ton at a given price per ton and its tables are convenient where it is necessary to divide tons and fractional parts by tons, etc. The first pages of each part have tons and their equivalents in pounds and the remaining pages of each part have the fractional parts of a ton arranged in hundredweights, quarters and pounds and their equivalents in pounds and decimal tons. The contents are so arranged that fractional parts of a ton from one hundredweight to another are always found on the right and left hand pages when the book is opened with the numbered index to the right of the page. For example: if the book is opened with the thumb on the page indexed 11, the fractional parts of a ton from 11 cwt., 0 qr., 1 lb., to 12 cwt., 9 qr., 0 lb., will be found on the two pages. A number of examples are given to show the scope of the tables and their general usefulness. The printing deserves a special word of praise. The type face is prominent and good judgment has been shown in the contrasts between the several columns of figures. There is an excellent index for each section of the book and the thumb index is reinforced by a double thickness of fabric on each page. The publisher is the author, William J. Mann, of South Bethlehem, Pa. Price, $2.

"A Treatise on Intermittent Gears" contains some of the experience of the Boston Gear Works, of Boston, Mass., in the making of this class of gears. The pamphlet is not confined exclusively to intermittent gears, but has a bevel gear chart, tables of horse power and weights, and much other information of general machine shops service is condensed into some 60 5 x 8¼-in. pages. The book is presumably for gratuitous distribution. The treatise is freely illustrated and is evidently written by those competent to handle gear subjects.

The contents of "An Engineering Student's Notes" were written in the main between 1890 and 1897 by J. Richards and published in *Industry*, of San Francisco, of which he was at that time the editor. The purpose originally was to instruct his readers in the processes of engineering work by a somewhat humorous treatment that would divest the subject of the usual textbook style. The field was found too circumscribed, however, and the work was next contemplated on a plan which extended further into the general world. This is where the present revision begins and the book with but few exceptions omits so much as would fail to have interest for non-technical readers. The point of view from which an engineering student sees the world is here suggested by a chatty series of comments. He travels in company with an uncle, who has been long associated with cranks and eccentrics and is apt in opinion relating to kindred affairs. The notes extend to 201 cloth-bound pages, 5½ x 7½-in. They will be enjoyed by mechanics for their common sense philosophy. The publishers are the Industrial Publishing Co., 22 California street, San Francisco, Cal.

"Boiler Construction," by F. B. Kleinhans, is the work of a frequent contributor to *The Iron Trade Review*. The printing has had the attention to practical details which characterizes the publications of the Derry-Collard Co., the book being cloth bound, with 421 6 x 9-in. pages, besides a number of folding plates containing boiler details. The illustrations are especially attractive and show distinctly the material, machines and methods of boiler construction. The author makes no attempt to describe any other than the best methods of large manufacturers and the railroads. He gives a section to the description of boilers in general and presents reasons for his selection of the locomotive boiler as representative. The boiler is followed in the book exactly as the work advances in the shop, beginning with the laying out of the sheets, then shearing, drilling and punching, bending, assembling, calking, etc. The machinery of the boiler shop has noteworthy treatment. There is a section on boiler testing, a number of useful tables, etc. The book from start to finish is reminiscent of the modern boiler shop and is at once lucid and thorough. It is published by the Derry-Collard Co., of New York. Price, $3.

"Business Short Cuts" is one of the series entitled the "Office Library," projected and printed by the Book-Keeper Publishing Co., Ltd., of Detroit, Mich. The book deals with short cuts in accounting, bookkeeping, card indexing, advertising, correspondence and the general management of affairs. It has been prepared by the board of experts associated with the *Book-Keeper* and is usefully suggestive in many particulars. The information is in compact form and embraces a wide range. The volume has many reproductions of office forms and illustrations of improved methods for the systematic prosecution of business. A few of the engravings have been reduced to a size that does not permit of easy reading of all the details, but as a rule they are sufficiently clear. The index is complete, but is not alphabetically arranged and a reference may involve a prolonged search. Most of the data is arranged, however, by classes, though not so designated nor is this a trustworthy rule to follow, as may be seen by the items treating of correspondence, a subject which by the way is handled with much detail and skill. The book has 157 5 x 7½-in. pages bound in boards. Price, $1.

"Manufacturing Cost," by H. L. C. Hall, vice president of the International Accountants' Society, is also published by the Book-Keeper Publishing Co., of Detroit, Mich. It is cloth bound and has 180 pages uniform in size with the companion volume. The author has decided to deal mainly with the principles involved in cost systematizing. Most expositions of this subject consider particular cases, the special method and the accompanying forms in use by some successful manufacturer. These descriptions of systems in detail are unquestionably of value to other firms interested in allied lines of business, but they are not readily applicable to any one else. Here is the advantage of a scientific consideration of the matter on general principles, an outline of things essential and their interdependence. Obviously a system must be made to fit the user's needs and the office and shop management and equipment have no little influence upon the character of a suitable method of handling the question of manufacturing costs. The author, following this line of procedure, discusses organization, books and other records, cost and general accounts, cost systems and cost finding, store room, tool room, pattern shop, labor record, factory classification, shop orders, factory operations, etc. This is but a summary of the subjects treated succinctly in their appropriate chapters. Nor does the author stop at the description of what may be accomplished by appropriate forms and accounting methods simply as a matter of record, but he deals in a judicious manner with labor conditions in the plant. He has something to say about rules and regulations—the fact that the time clock is no injustice to the conscientious workman, the problem of fixing piece work rates, etc. There are numerous illustrations of office forms and equipment. The various time clocks and similar management conveniences are discussed and shown at such length as the limits of the book will permit. The work is carefully indexed, well printed and in tone and material is an interesting study of a most important subject. The price is $3.

Age Limit in Carnegie Steel Co. Mills.

We have been officially advised that no order has been issued by the Carnegie Steel Co. governing the age limit of its employes. Reports have been widely circulated that this company had put into effect an order instructing heads of departments in the various plants to employ no men over 35 years of age and extending the limit to 40 in others. Such a policy has been followed, however, in another important subsidiary company of the Steel Corporation.

Manistee Iron Works Co., Manistee, Mich., advises us that it has booked orders within the past month for more than a year's work. A large part of this machinery is for shipment to England, consisting of the company's newly designed steam pumps, air pumps and salt making machinery. Its export trade in the last eight months has been very gratifying; the aggregate tonnage of the machinery shipped in this period amounting to between 700 and 800 tons. The company advises us that it is building an addition to its foundry, 30 ft. x 100 ft.

THE BARRETT-HICKERSON BOILER ATTACHMENT.

In many cities of the United States laws have been passed with a view to overcoming the "smoke nuisance," and as a result a great deal of time and money has been spent on various devices for boiler plants. Some of these consist of apparatus connected with the combustion chamber with a view to supplying sufficient air to cause complete combustion, while others involve alterations to grates, bridge walls and boiler settings, for the accomplishment of the same purpose, either by supplying the additional oxygen required, or by repassing the products of combustion through the flame. The two methods to a certain extent are combined in the Barrett-Hickerson device, an attachment that may be applied to any boiler by slightly altering the construction of the bridge wall.

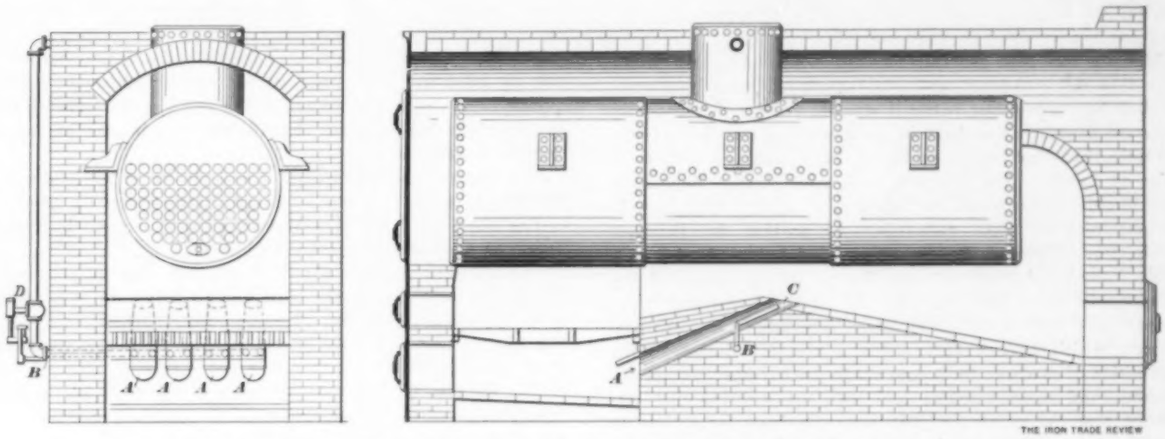
The illustration shows cross and longitudinal sections of the device as applied to a common return fire tube boiler. The general boiler setting, grates, ash pit, fire and clean-out doors have not been disturbed. Instead of the bridge wall having the short horizontal top, its construction has been altered so as to give it a wider top having a slight upward pitch, thus gradually concentrating the gases before they pass into the combustion chamber. In the bridge wall and connecting the ash pit with the combustion chamber, are built a series of air ducts, as indicated at A on the drawings, through which the additional air is conducted to the combustion chamber without passing through the bed of the fire.

Running horizontally through the bridge wall and at right angles to the air ducts, is a small steam pipe B, controlled by a valve D, and connected with a series of nozzles C, one in the center of each air duct near its upper end; the steam discharging in the direction of the travel of the air. The lower ends of the air ducts are controlled by dampers actuated by a common rod supported on the face of the bridge wall below the grate bars, and having one end extending beyond the outer face of the boiler setting and connected through a set of levers with the controlling rod, which extends to the front of the boiler. A short slot is cut in this rod at a convenient point, in which the end of a lever, controlling the steam supply valve, can be adjusted and clamped in any desired position. By moving the controlling rod back and forth the dampers at the base of the air ducts are opened and closed simultaneously with the opening and closing of the steam supply valve; and by the slot referred to above the amount of steam admitted for any given damper opening can be regulated at will.

When the apparatus is used for smoke consumption only the controlling device can be made practically automatic by extending and attaching it through another set of levers to the doors of the fire box and ash pit, so that the opening of the fire doors for coaling will also open the air duct dampers and steam supply valve, and close the ash pit doors.

On disconnecting the steam valve lever from the controlling rod the air supply can be regulated independently of the steam supply. This is advantageous when starting up the furnace, at which time the dampers are kept closed until there is sufficient draft in the combustion chamber to cause a suction through the air ducts. The dampers are then adjusted to supply the required quantity of air to produce complete combustion. When steam has been generated in the boiler the valve lever is again attached to the controlling rod, and in such a position in the slot as to give the desired relation between steam and air supplies, when they can be regulated by the controlling rod for any required quantity.

None of the metal parts of the apparatus are in contact with the flame. The steam nozzles, however, are kept at a high temperature by the heat transmitted through the walls of the air ducts; and as the steam comes in contact with the heated nozzles immediately before its greatest expansion takes place, the usual condensation is prevented and its velocity increased, resulting in a strong injector action in the air ducts with a minimum consumption of steam, and a more ready separation of the oxygen from the steam upon its mixing with the hot products of combustion. When the ash pit doors are closed any small leakage of air will freely pass to the combustion chamber through the air ducts and not through the resistance offered by the bed of the fire, thus supplying, together with the steam and independently of the rate of consumption of the fuel, the necessary oxygen for complete combustion. By properly regulating the amount of opening of the ash pit doors to the opening of the air duct dampers and steam supply, the draft through the ducts will be increased, and the injector action of the steam will induce the pressure in the fire box to fall below that in the ash pit, and a portion of the air will immediately pass up through the grates increasing the rate of combustion, according to the experiments made by the manufacturers. They find that with this device combustion takes place at two distinct points. Partial combustion in the fire box and the liberation of the unconsumed gases from the fuel; and the consumption of these gases in the combustion chamber by their combining them with the necessary oxygen. The general result being one continuous flame throughout the combustion chamber, and more uniform conditions through the entire boiler.



CROSS AND LONGITUDINAL SECTIONS OF BOILER WITH BARRETT-HICKERSON ATTACHMENT.

The device has been tested by the United States Government at the Bureau of Engraving and Printing at Washington, where a fifteen days' run of the apparatus, attached to a B. & W. boiler with Hawley furnaces, using soft coal, showed a saving in the cost of fuel per k. w. output of the plant of 10 percent. A 24-hour test showed a saving in the cost of evaporating 1,000 lb. of water from and at 212 degrees of 12.75 percent, with the entire elimination of smoke. The following extracts are made from the report of the mechanical engineer, Charles A. Blatchley, of the Bureau of Printing and Engraving:

"The above results show a saving in the cost of evaporating 1,000 lb. of water, by the use of the apparatus, of 12.75 percent. The general condition of the boiler, including the fire, was much more uniform while the apparatus was in use. The steam pressure during the test without the apparatus varied from 125 to 110 lb. while cleaning fires; or 12 percent. During the test with the apparatus in service the maximum drop was from 125 to 120 lb. or only 4 percent. The draft in the breeching was also more uniform during the second test, only

varying between .5 and .6 in., while during the test without the apparatus in service for variation was from .4 to .7 in. The only smoke emitted from the stack while the apparatus was in service was that due to the burning of refuse in the other boilers; and the smoke made by the burning of oil for the ink-making division, which latter is admitted to the stack near its base and beyond the end of the boiler breeching; and therefore cannot be controlled by any apparatus attached to the boilers. The above results include the water evaporated for use in the apparatus itself; the steam supply to the bridge wall retorts being a ¼-in. pipe with valve opened ⅛ turn."

The Barrett-Hickerson device is the joint invention of Messrs. James B. Barrett and John W. Hickerson, and all American and foreign rights are controlled by the International Boiler Improvement Co., Inc., with offices at Washington, D. C.

The Eastern Machinery Market.

NEW YORK OFFICE OF *The Iron Trade Review*, }
ROOM 1315, No. 150 NASSAU ST., Oct. 4. }

Interviews with machinery men in this vicinity as to business conditions in September, by way of comparison with August, brought forth divergent views. Some said that there was no change in the situation, while others, and they were in the majority, found at least a slight improvement. Every one seen, however, was confident that developments, as a whole, favored more prosperous conditions in the machinery trade. On the question when a decided improvement could be expected, some machinery men looked for it immediately following the election, while others thought it would not materialize before the new year opened.

Machine tool men generally booked more orders last month than they did in August, and as a further evidence that things in their line are getting better it was pointed out that not only have the machines they keep in stock been appreciably reduced recently, but that many concerns have been compelled to take on hands. The machine tool trade during September was largely interested in the outcome of several large specifications received from railroads. At present the Pennsylvania, Philadelphia & Reading, Erie, and Lehigh Valley railroads have good sized lists out, but as yet no orders of any consequence have been placed. All of the companies mentioned have made small purchases at intervals during the past month, which haven't borne even a remote relation to the quantities of machine tools covered by their respective specifications, and some machine tool men are positive that this means that the companies will only purchase from time to time, and not all they need outright. The General Electric Co. is expected to enter the market at any time with a good sized machine tool proposition, and manufacturing establishments are expected to purchase freely in the near future. Inquiries were very satisfactory during September, and prices better maintained than in any month of the present year.

In engines and boilers many manufacturers say September was very quiet. There are some very good contracts hanging fire, such as the Waterside station of the New York Edison Co., which will be equipped to furnish 111,000 h. p., and the power equipment that will be needed in connection with the East River section of the Pennsylvania tunnel. Outside of these there were few if any engine propositions of note in prospect. Orders for small engines, from 100 to 300 h. p. have fallen off also. Manufacturers say their inquiries have not been as good as they were during the summer months. In boilers practically the same conditions are reported. A redeeming feature in the engine trade is that prices no longer show the sagging tendency that has characterized them for several months past.

In electrical machinery there were a few good sized contracts placed in September, but in the main orders were made up of small lots. Inquiries were promising. In some quarters it was said that prices were being shaded, representatives of a leading interest having come across reductions in engine type generators which were all the way from 5 to 15 percent. On the other hand, we are informed that a few days ago the General Electric Co. cancelled all its standing prices for standard equipment, and will issue new price lists which will show an advance over those which have been in vogue.

In power transmitting machinery September was an exceptionally good month. Manufacturers of wood-working machinery also note an improvement in their line. In machinists' contractors', railway and engineers' suplies, September was a much better month than for some time past.

The foreign machinery trade is now more active than for months past. Electrical machinery leads in the matter of orders, but machine tool men have booked some good orders also.

The Niles-Bement-Pond Co. was very much pleased with its September business, which showed substantial improvement over August. The company believes the outlook for the machinery trade to be of the brightest. Secretary Davis, of this company, who has been in poor health for over a year, is reported to have taken a change for the worse, and some of his intimate friends despair of his recovery. Mr. Davis is one of the best known and most popular men in the local machinery district.

Manning, Maxwell & Moore report that their orders during the past month were better than for several months. They note a gratifying increase in inquiries, and look for a steady improvement in the machinery world during the next month or so.

The Prentiss Tool & Supply Co.'s business for September was satisfactory with small orders, coming at frequent intervals, the feature.

James McCabe, who handles a good line of machine tools, reports his September business to have been quiet. He looks for no improvement of any consequence in trade before the new year.

Hill, Clarke & Co. say their trade continues to be excellent. Their orders during the past month resulted in their stock being considerably reduced.

The Van Dyke-Churchill Co.'s business for September was not as good as in August, which was an unusually good month. This company recently received a good order from the Pennsylvania railroad. Its Philadelphia branch has been very busy recently.

The Ingersoll-Sergeant Drill Co. finds its order lists constantly expanding. It reports foreign trade especially good.

The Rand Drill Co. is well satisfied with current business. Inquiries are increasing quite rapidly also.

The Crocker-Wheeler Co. booked some very good orders during the past month, the most notable being for two 2,000-k. w. generators from the Huronian Co., Turbine, Ont., and for one 75 and one 50-k. w. generators from the Progress Club, this city.

The George V. Cresson Co. reports that its trade in the power transmitting machinery line is gradually getting better, with orders more widely distributed than for some time past.

The A. & F. Brown Co., manufacturer of power transmitting equipment, notes an appreciable improvement in its business during the past month.

The American Wood-Working Machinery Co. reports that September orders were as large in the aggregate as those booked during the same month last year. All of the company's plants, with one or two exceptions, are now running on full time.

The Lidgerwood Mfg. Co., manufacturer of hoisting engines, notes a slight change for the better. It expects normal conditions to prevail in the machinery trade for the remainder of the year.

The Thayer & Co., Inc., manufacturer of steam boilers, report trade to be only of an ordinary character, with nothing of a special character probable in the near future.

W. B. Mayo, representing the Hooven, Owens, Rentschler Co., said September was a quiet month, with new business in sight not as encouraging as was expected a few weeks ago.

Olney & Warren, who handle boilers and gas engines, find trade fairly good. They made some substantial foreign shipments during the past month.

The Big Four railroad is preparing for a heavy winter's work in its shops. During the summer the motive power and rolling stock has been kept so busy that it has been impossible to give it the care it needed, and there is an overwhelming amount of work to be done to fit the equipment for a hard winter's campaign. New lathes, drills and other machine tools have been purchased recently and the number of employes at the division shops at Bellefontaine, O., will be increased.

BLAISDELL SPECIAL HIGH SPEED LATHE.

The special high speed lathe manufactured by P. Blaisdell & Co., of Worcester, Mass., is nominally a 20-in. machine but has an actual swing of 22 in. It has been especially designed to meet the demands made by the use of high speed steels but is also well adapted for the economical turning of work from the smallest to the largest that will swing in the lathe. The machine is powerfully double backgeared and built to stand the strain of heavy and coarse cuts.

The lathe is shown with the usual attachments in Fig. 1,

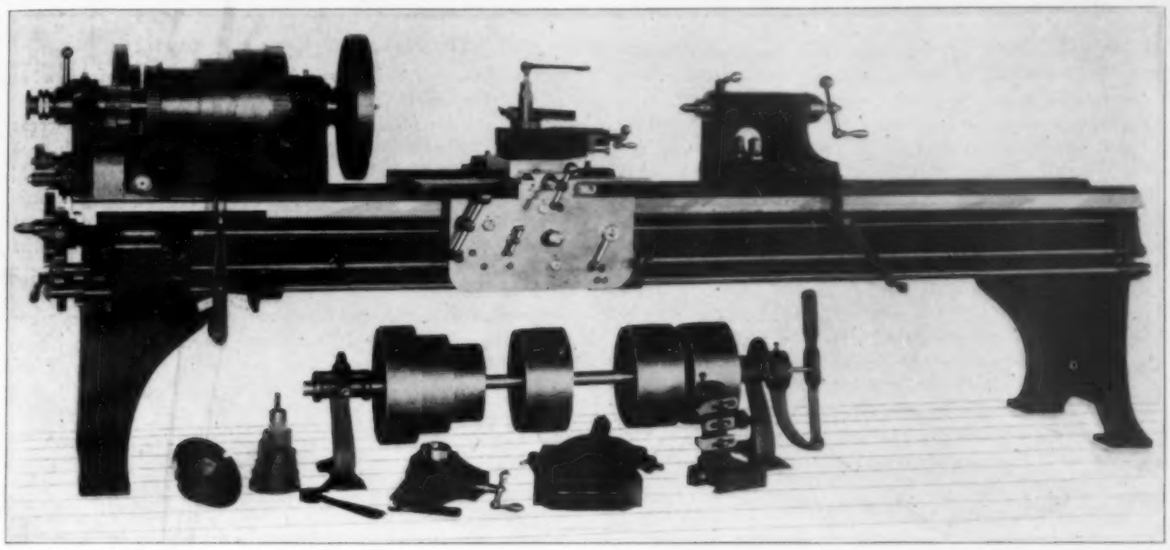


FIG. 1.—THE NEW HIGH SPEED BLAISDELL LATHE.

and Fig. 2 presents views of the rapid change feed gearing. The handle for manipulating the feed changes is conveniently arranged and the swinging of the lever from hole to hole in the sector brings a spring-actuated key in connection with the different gear combustions in the box as is illustrated in outline in the two views seen in Fig. 2. A sliding clutch of simple but effective design brings the lead screw into gear with the change speed box gears when thread cutting is required. Another prominent feature of the machine is the lateral feed friction which is new and of powerful construction.

The bed is of the box pattern, strongly ribbed, made broad, with wide ways. The head is massive and strongly webbed to withstand all possible strains. The crucible cast steel hollow spindle runs in phosphor bronze self-oiling bearings of the

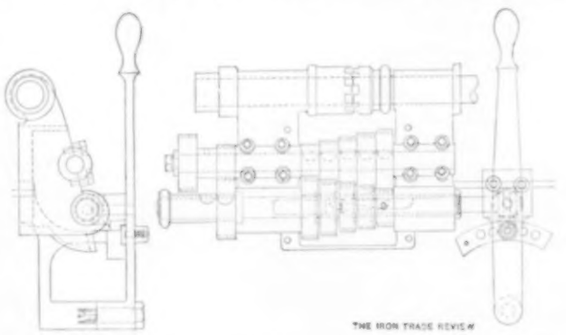


FIG. 2.—END AND FRONT ELEVATIONS OF FEED GEAR BOX ON BLAISDELL LATHE.

best quality. The front bearing is 3½ in. in diameter by 5½-in. long. The hole in the spindle is 1 7-16-in. in diameter, thereby not weakening the spindle. The driving is by means of a three-speed cone pulley with steps 9¼, 11⅝ and 14-in. in diameter by 3⅞-in. face, to take 3¾-in. belt. There are two rates of back gearing, 3½ and 12 to 1, these with patent three-speed countershaft, giving 27 spindle speeds, 18 of which are geared. The lower power gear is very valuable when high speed and power is demanded for turning large steel bars at a high rate of speed. A reverse motion is fitted to the head, operated by a handle conveniently located at the right side of the apron, so that all feeds or screw cutting can be instantly reversed or thrown out entirely by the operator.

The tail stock is of the patent cut away type and strongly webbed. It is fastened to the bed by two bolts, the front one playing in a slot that allows the bolt head to be moved back out of the way of the compound when necessary. It is provided with a pinion gear and lever to move it easily on the bed. Spindle is 2⅜-in. in diameter.

The carriage has large bearing surfaces 29-in. in length by 1½-in. in width on both front and back ways,—is substantially gibbed to the bed, is self-oiling and warranted to be perfect in alignment. The compound rest has graduated swivel adjustment and patented binder, power cross and angular feeds with graduated adjustments. All the usual motions are contained in front of apron, including lever for attaching or releasing screw in screw cutting, also lever for reversing or stopping feeds or screw.

There are ninety positive feeds in proper ratio of five for each thread lathe will cut. These range from 8 to 288, all operated by hand lever in front of the head.

Lathe is provided with full set of change gears to cut from 2 to 23, ncluding 11½ pipe thread, large and small face plates, center and follow rests, side block for turning full swing of lathe, all necessary wrenches complete with patented three-pulley countershaft.

A patented pulley turning attachment can be furnished with this lathe. It is composed of four simple parts which can be attached to any of the taper turning lathes of this make in five minutes. It is claimed to be capable of turning a hundred pulleys, 12-in. by 5-in., in ten hours, taking two chips each, one roughing and one finishing. The pulleys to be accurately crowned, both edges nicely rounded, all of the same diameter within .003 limit.

A St. Louis Exposition souvenir of the International Nickel Co., 43 Exchange Place, New York, is a malleable nickel medal about the size of a 50-cent piece. The obverse side bears a bust in relief of Joseph Wharton, and in the margin it is told that he first produced malleable nickel in 1865. The medal is put up in a neat case and lies in a green plush socket.

The foundry and machine shop of the Ashland Iron Works, of Ashland, Ore., burned Sept. 25, causing a loss of $10,000. The pattern shop was saved. The company carried insurance to the amount of $6,500.

Four of the twelve open-hearth furnaces of the Carnegie Steel Co., South Sharon, Pa., resumed operation this week.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

The Polishing of Metal.

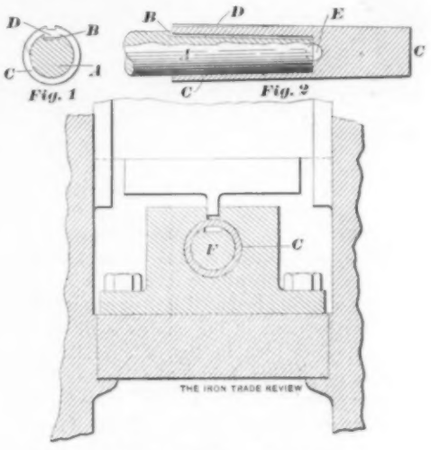
Metal polishing is of very general interest to mechanics whether it be based upon the scientific requirement which endorses the steam saving qualities of highly polished cylinders or the influence of shining hand rails and door knobs upon the mind. Anything making for polish on metal surfaces has due bearing on the mechanic arts and it is really surprising what can be done in this direction with apparently simple means. Take the bag shown in the engraving. It is porous like most other bags, but is of convenient size for the hand and contains a polishing material. Nothing would seem further from novelty either in form or composition; but an inventor, Joseph L. Guyon, of Chicago, employs a similar view to illustrate "certain new and useful improvements" and this is what he says in brief: "A designates as a whole a bag formed of pervious material, that preferably employed being a relatively closely-woven and heavy cotton drilling or canton flannel. The bag may be formed in any suitable manner and is desirably made of a size convenient to be readily grasped in the hand, the device being used by applying the bag to the article to be polished or cleaned and rubbing it therewith. In the particular instance illustrated the bag is formed by suitably folding together an oblong rectangular blank of cloth and sewing together the top, bottom and side edges, one

THE APPLICATION OF METAL POLISH.

side or end being left open in order to fill the bag and being closed after filling. The filling compound is composed of a finely pulverized abrasive material insoluble in water and a vehicle of absorbent and insoluble material. I have found in practice that finely pulverized whiting constitutes a very suitable polishing ingredient and that ordinary sawdust forms a suitable filler. It will be obvious, however, that emery powder or other abrasive material may be substituted for whiting and that in place of the sawdust any other absorbent material which will preserve its character when subjected to repeated wetting and using without caking may be employed—the function of the filler is to maintain the finely pulverized abradant in condition to quickly absorb the liquid into which the device is dipped preparatory to using it; to act as a distributer, which insures a constant filtering out of the abradant through the cover in use, and to impart to the bag as a whole such a character that it will readily dry out and remain in friable condition indefinitely. For example, granulated cork has been found to answer the purpose of a filler very well. I have found a satisfactory mixture to be composed of approximately equal quantities of whiting and sawdust in bulk. In using the device—as, for example, in cleaning windows or smooth metal surfaces—the entire bag is simply dipped in water and allowed to remain until it becomes more or less saturated, after which the polisher is applied over the surface to be cleaned or polished in the same way as though it were a polishing pad or cloth. While the device will ordinarily be used with water as a saturating medium, yet it will be obvious that in such cases where the use of water is objectionable the polisher may be dipped in benzine, gasolene, or other volatile liquid. After the device has been used it is simply laid away and permitted to dry out. After thus drying it will usually be found caked to a greater or less extent, but nevertheless in readily friable condition, so that when again dipped in liquid it almost instantly resumes its soft and pliable condition."

The Making of Keys and Keyways.

F. T. Laws, of Failsworth, William C. Smith, of Manchester, and George J. Gibbs, of York, England, bring forward a construction for machine shop use which suggests the increasing favor of press work. The invention is shown in connection with drill shanks, but it is equally applicable for holding other tools and machine elements. The inventors point out in the preamble to the specifications: "Prior to the date of our invention, and more especially in connection with what are known as 'twist-drills,' it has been a common practice to provide the latter with a tapering shank terminating in a flattened tang at the small end and adapted to fit into a correspondingly tapered drill socket, provided also with an elongated slot corresponding to the tang. It has been found



ANOTHER USE FOR THE PRESS.

in heavy work that the flattened tangs of the drills are very often twisted off by the torsional strain on them, and in consequence the sockets turn with the spindle of the machine, but do not drive the drills. To overcome this objection, in recent years several devices have been adopted whereby the drill might be held at some portion in the length of its shank in addition to being held by its flattened tang. In one case the drill is provided with a continuous flat surface engaging with a corresponding surface in the drill stock. In a second device a groove is cut longitudinally of the shank and is engaged by a small feather operated by a cam-sleeve. In a third invention the shank of the drill has also a groove which is engaged by a spring controlled feather, while in another case one or both of the ordinary cutting grooves in the drill are continued forward along the full length of the shank, and a corresponding piece or pieces are let into the socket for driving the drill."

The present improvement consists essentially in providing the drill shank with a continuous groove and the drill socket with a feather to correspond, the feather being pressed out of the material of which the socket is made. Fig. 1 is an end elevation of a drill socket with the drill in cross section. Fig. 2 is a longitudinal section of the drill socket and Fig. 3 is a partial sectional elevation of the tools employed for forming the feather in the drill socket. The drill A has a groove B along the shank. The drill socket C has a tapering hole to fit the shank of the drill and has at one side the feather D corresponding to the shape of the groove formed in the drill. The feather fits closely to the sides of the groove B, but may

be clear of the bottom of the slot as shown in Fig. 1. The drill can be further provided with a hole E for the insertion of a tool to disengage the drill from the socket.

The feather D is formed out of the material in the socket C by the means depicted in Fig. 3. This is an ordinary press with a bearing block bored out to fit the drill socket. A mandrel F has a shank similar to that of the drill which is to be used in connection with the socket. The mandrel has a groove corresponding to that in the drill shank and on the press tool descending it will force the metal inward to obtain the feather seen in Fig. 1.

An Adjustable Reamer.

Of the design of adjustable tools there would appear to be no end in sight and the latest device for this purpose is the invention of Charles A. Ast, of Lake, Wis. Fig. 1 is a view

FIG. 1.—THE AST ADJUSTABLE REAMER.

of the tool complete and Fig. 2 is a longitudinal section. Fig. 3 is a transverse section on the line a-a of Fig. 2 and Fig. 4 is a similar section through the reamer at the point of b-b of Fig. 2.

The reamer shank has a hollow cylindrical head A having a threaded neck. The tubular head A has a series of regularly spaced slots running lengthwise with parallel walls. The cutter blades B have a snug working fit in the slots with the usual beveled edges and near each end of their inner edges they are provided with holes C through which pass spring bands D seated in annular grooves in the bore of the head A and having the tendency of drawing the cutter blades inward.

A cam arbor E has as many sides as there are blades and has a rounded stem fitting inside the neck of the head A, the spring bands D pressing the blades of the reamer against the sides of the cam arbor. At the outer end of the cam arbor is a boss fitting tightly in the center of a circular plate F which

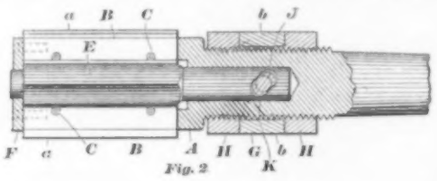


Fig. 2

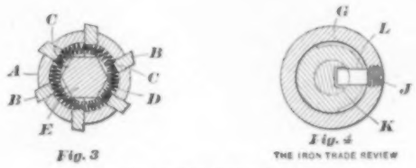


Fig. 3 Fig. 4

THE IRON TRADE REVIEW

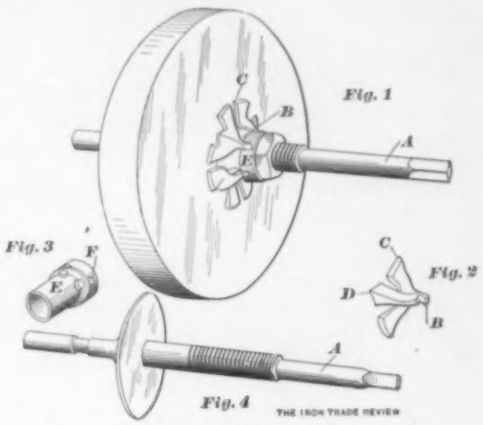
DETAILS OF ADJUSTABLE REAMER.

is additionally secured by screws. The loose ring G is confined between two nuts H threaded on the reamer neck. A threaded pin J fits a tapped hole in the collar G and projects through a slot L and into the inclined groove K. This inclined groove is cut in the stem of the arbor E. The endwise movement of the ring G when the nuts are adjusted, causes the pin J to slide along the straight slot L and thus turn the cam arbor and spread or retract the reamer blades.

The Hanging of Grindstones.

The fitting of round shafts into square holes is only accepted practice in the case of the very ordinary shop grindstone and one way of doing this work is the subject of an invention recently patented by M. Delgoff, of Menominee, Mich.

It is assumed that the grindstone has a *square* hole at the *center* and four clasps are employed to bring the four corners equidistant from the supporting shaft. Fig. 1 is a prospective view of the grindstone as mounted, Fig. 2 is a detailed view of one of the four clasps or forks, Fig. 3 is a prospective view of the clasp collar and Fig. 4 presents the spindle and flange in perspective. The spindle A has a flange to rest against one side of the grindstone and maintain it at right angles. The four forks, Fig. 2, have a hook B at one end and at the other have three prongs or feet, the middle one D enters the hole in the grindstone while the other two C rest against the surface, straddling the opening. A thread E is cut on the spindle A for the retaining nut.

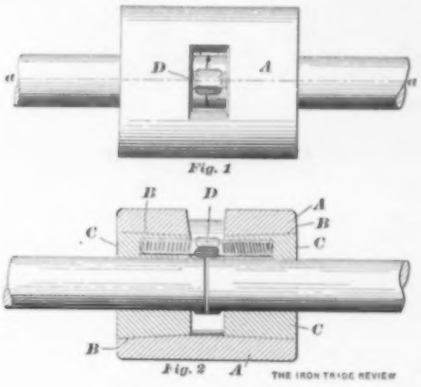


THE CENTERING OF SHAFTS IN SQUARE HOLES.

The grindstone is placed over the spindle and against the flange, the four forks are located one in each corner of the square opening and the hooks B hitched to the socket pins L in the collar, Fig. 3, and then the whole thing is tightened up with the nut. This forces the stone against the flange and if the collar and the forks as well as the square opening in the grindstone have been accurately made to the specifications then the result will be all that could be desired.

A Shaft Coupling.

The latest form of patented shaft coupling is an invention devised by George R. Rich, of Chicago. Fig. 1 is a plan of the device and Fig. 2 is a section along the line a-a of Fig. 1. The ends of the two shafts enter a strong sleeve A. This is tapered in the bore both ways from the center to form the conical surfaces B. A series of segments C are introduced between the sleeve and the shafts. The segments are cylindrical on their inner surfaces to fit the shafts and conical on the outer surfaces to fit the interior of the sleeve. Any number of these segments may be employed according to the fancy of the designer, but six, three on each shaft, are suggested by the inventor. Bolts D, threaded at both ends and having the middle of their length shaped to fit a wrench, connect the segments up in pairs. Openings are formed in the wall of the sleeve in order that the screws in the segments can be easily reached with a wrench.



A SMOOTH COUPLING.

It will be evident that the contrivance has no projecting pieces to catch workmen's clothes and that when the parts have been put in place and bolts tightened the shafts can be brought into perfect alignment by turning the proper bolts.

Die for Taper Threads.

William Vosper, of Sandusky, O., has invented a threading die which is manufactured in three sizes by the Toledo Pipe Threading Machine Co., of Toledo, O. Every mechanic

is familiar with the ordinary pipe threading die and the unsightly work it is capable of doing. In the present instance the inventor proposes certain changes in the construction of the die as will tend in his opinion to greatly improve the product.

Fig. 1 is an end elevation of a die made in accordance with

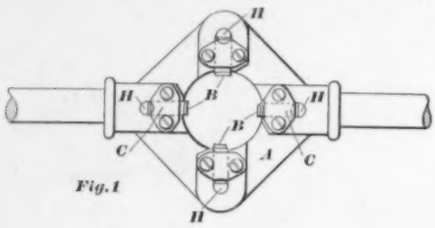


Fig. 1

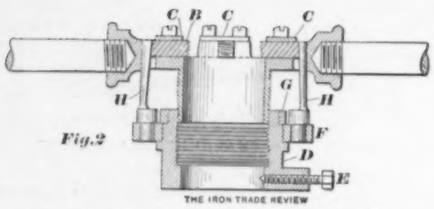


Fig. 2

THREADING DIE WITH TAPER ATTACHMENT.

the invention and Fig. 2 is a sectional elevation through the center of the device. A is the die carrying head and on the upper surface of this head is supported a series of chasers B which slide radially or endwise in guides. These are held by clamping plates C against the face of the die head. The work holder F is threaded internally to engage the screw threads on the sleeve which is formed integral with the die head A. This sleeve has one or more set screws E to clamp the pipe, or whatever is to be threaded, securely within the work holder.

The work holder D has a flange supporting the collar F and above this collar is a threaded ring G to hold the work holder and the collar F relatively in place, but allowing the one to turn freely around the other.

The collar F has pins H which project through holes in the head A. These pins have a taper at the side which engages with the rear ends of the chasers while the straight side moves against the wall of the hole in the head A, the rear ends of the chasers being beveled to fit the taper side of the pins. The halftones show the hand and machine sizes of these threading dies and the dissected parts in the larger view illustrate the proportion and purpose of the elements.

The operation of the device is as follows: The work to be threaded is inserted through the openings in the holder and the internal sleeve until it comes in contact with the inner sides of the chasers B. The clamping screws are then tightened and the head carrying the cutters is rotated upon the work and the part A and the holder by means of their threaded engagement approach each other. The ring F and the pins H rotate with the head. As the work proceeds the inclined faces of the pins permit the chasers to recede radially, thus gradually increasing the diameter of the thread which conforms with the taper of the pins H. The chasers B are set out from the outer face of the head A as shown to allow lubricant to be applied readily and to permit the chips to fall freely clear of the work. The face of the cutters being much narrower than the length of the thread and the first two or three teeth of the chasers doing the cutting, there will be no burr left in their wake. The guide pins and plate have a slight travel endwise to allow the chasers to loosen sufficiently in backing off and avoid scratching the thread.

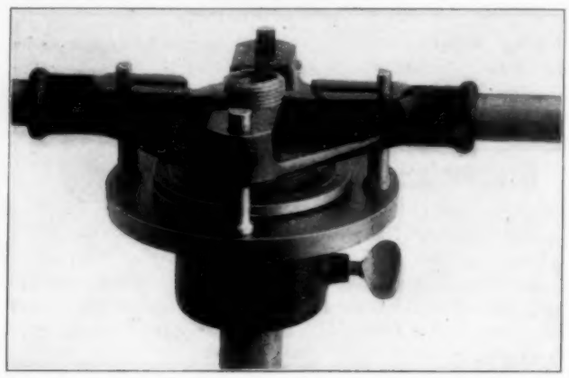


FIG. 3.—THE DIE AND STOCK FOR HAND OPERATION.

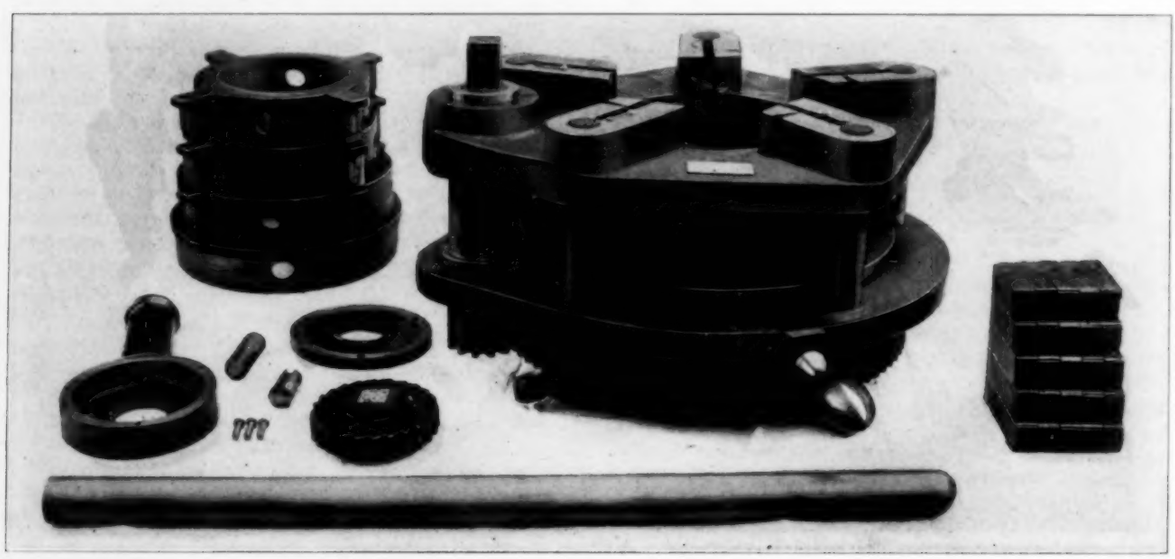


FIG. 4.—DIE AND STOCK FOR THREADING 4½ TO 8 IN. PIPE.

The Opening of Firebox Doors.

The invention of William Gowin, of Dexter, Iowa, provides a means of opening firebox doors by a lever on which the operator places his foot. The device includes a latch for locking the furnace door in a closed position and also has the advantage of the door swinging from an open to a closed position without the assistance of the fireman.

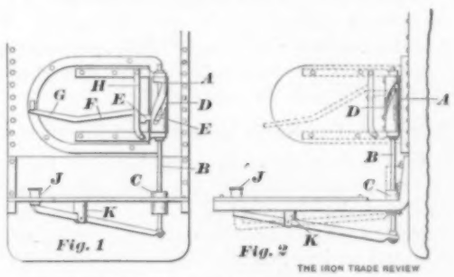
A front elevation of a furnace door with the device in place is illustrated in Fig. 1. This is a side elevation showing the relative position of the invention to the door of the furnace. The furnace door is shown in an open position in Fig. 2 by the dotted lines. A sleeve A is firmly attached to the outside of the boiler and has bearings at top and bottom for the

vertical shaft B. The lower end of the shaft B extends below the level of the platform in front of the boiler and has a weight C, heavy enough to hold the shaft at the lower level of its movement. The inner portion of the sleeve A is cut away at the side to allow for the upward and rearward movement of the device for tripping the lever which locks the door. Extending from the lower end of the sleeve A to the upper end is the curved slot D.

A collar E is fastened on the shaft B and has a lug capable of sliding vertically of the rear end of the firebox door, the collar E having also a bearing in the curved slot D by means of a roller. A locking lever is pivoted to the door and has one portion engaging with the upper part of the lug E and has a forward portion G engaging with the catch on the door. This lever is designed to normally hold the door in a closed position. The rear end of the locking lever at F is heavier than the forward end and is thus maintained in contact with the lug on the collar E.

It will be seen that as the shaft C is moved upward the lug on the collar E will swing the outer end G of the lever away from the catch on the door. The shaft will rotate on account of the roller moving along the curved slot D and the lug pressing on the brace H across the door will swing the latter from a closed to an open position as the shaft is forced upward. A pedal J connects with a lever under the platform which is suspended by a lug K, the lever at the other end meeting the shaft B.

When the firemen gets his shovelful of coal and presses his foot upon the pedal J, the shaft B is thrust upward and rotates, freeing the catch and then rotating the door. As soon as he has thrown in his shovelful of coal and removed his foot from the pedal, the weight C drives the vertical shaft



A DOOR OPENING DEVICE FOR THE FIREMAN.

downward closing the door and as the latter swings to its place the locking lever drops to a normal position fastening the door.

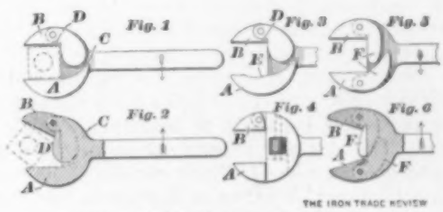
A Novelty in Wrenches.

Marshal Halstead and James Chandler, of Birmingham, Eng., have not been satisfied with the common wrench and its operation. Some time, not much, certainly, but still an appreciable amount, is required to apply the wrench to the nut, make a sixth of a turn or whatever the surroundings will permit, remove the wrench and fit it again to another place on the nut. The time taken for the actual turning of the nut is, of course, increased by the amount required for the removal and refitting of the wrench after each movement of the nut and if the latter is in a dark place—and many of the machine shops and other places where nuts of a machinery type are plentiful over there and elsewhere are not any too well lighted—the idle movements of the wrench about the nut can be reduced with general benefit to all concerned. The actual tightening or loosening of nuts is the proper province of wrenches and whatever does not make to this end is to be avoided wherever possible. The perverted zeal which sees a hammer in a wrench and so employs it will not be countenanced by the judicious craftsman.

A number of wrenches are illustrated by the engravings. All of them exhibit the property of easily freeing the wrench from the nut by the mere backward sweep of the wrench shank, the nut turning within the space between the jaws. Figs. 1 and 2 are side elevations of such a wrench showing the hinged jaw closed and open. The other illustrations show modified forms of the wrench. The jaw A is rigid on the head of the wrench and the jaw B is hinged to the flat stock of the head and shank C. The jaw B is capable of opening outwardly as represented by Fig. 2 and thus enlarging the opening between the jaws. When the wrench is in use to turn the nut, the jaws A and B grip at diagonally opposite ends and on opposite flats and therefore the hinging of the jaw B in this form of the invention is such that the nipping part is inward of the pivot at D. When the jaw is closed as in Fig. 1 the part D forms a solid abutment against the head of the wrench. Fig. 2 shows how the wrench turns on the nut without leaving the latter, the direction of wrench rotation being indicated by the arrow, the nut at the time being stationary.

In Fig. 3 the rigid jaw A is cut away at E, but otherwise the wrench is the same as in Figs. 1 and 2. This cutting away allows that corner of the nut in the adjacent part of the throat immediate freedom when the wrench is shifted from flat to flat. The invention is seen in Fig. 4 in monkey wrench style, but with the exception of the adjustable jaw handled by a screw the general arrangement is similar to the other views of the device. The device is applied in Figs. 5 and 6 to both jaws of the wrench. The two jaws A and B are here hinged to the shank and each has a tailpiece F, the one having a bearing on the other. The closing of the jaw B forces a closing of the jaw A and it will be seen that so long as the jaw B is closed the jaw A cannot open, the jaw B being shown as the primary jaw of the two with the wrench operating in the direction of the arrow to turn the nut.

The hinged jaw will open sufficiently to clear the corners of the nut in each case and thus acts as a guide when the shank is swung backward. Any greater opening would be inconvenient and for that matter would be equivalent to discarding the hinged jaw altogether. The loose jaw is claimed as a help in the initial taking hold of the nut easily and this ratchet action has its advantages no doubt, but there are many places where the solid wrench will hold its own,



WRENCH WITH RATCHET ATTACHMENT.

as in the adjustment of checknuts for example, and the ordinary wrench will act either way, and owing to this facility and its angular arrangement of the jaws will work conveniently in more limited space than the tool here described.

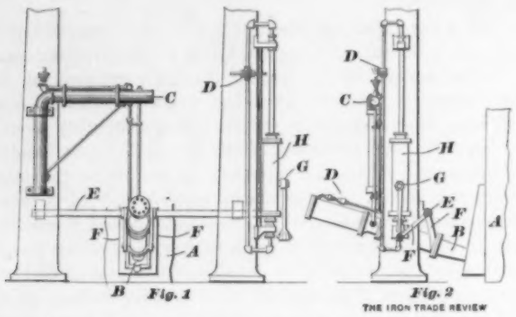
Contracts for two more large freighters have been secured by the American Ship Building Co., making seven modern steamers that have been contracted for during the past few weeks for 1905 delivery. The larger of the vessels just ordered will be built for H. S. Wilkinson and L. C. Smith, who are the principal stockholders in the United States Transportation Co., which operates a large fleet of steel steamers. This boat will be a duplicate of the steamer contracted for by Samuel Mather about two weeks ago, and will have a carrying capacity of 10,000 tons. She will be 545 ft. over all, 525 ft. keel, 55 ft. beam and 31 ft. deep. The contract for the second steamer was closed by the Buffalo & Susquehanna Steamship Co., of which F. H. Goodyear and S. H. Clement, of Buffalo, and Capt. John Mitchell, of Cleveland, are the principal stockholders. Her dimensions are 500 ft. over all, 480 ft. keel, 52 ft. beam and 30 ft. deep. She will have a carrying capacity of 9,000 tons.

Spencer Miller, chief engineer of the Lidgerwood Mfg. Co., New York, has returned from St. Petersburg, Russia, having gone at the request of the Russian government to inspect 10 Lidgerwood marine cableways which had been installed upon the 10 largest battleships and cruisers of the Baltic fleet, known in Russia as the Second Pacific squadron, the sailing of which has been a matter of much discussion for three months past.

NEW BLAST FURNACE DEVICES.

Improved Method of Handling the Mud Gun.

Felix McCarthy, of Pottstown, Pa., superintendent of the Warwick furnaces for twenty years, has made a number of improvements in the mud gun and its manipulation. In commenting upon his invention Mr. McCarthy says: "The old way of closing the iron hole was by hand and this meant anywhere from ten minutes to an hour. Then Mr. Samuel



FRONT AND SIDE VIEWS OF THE M'CARTHY APPARATUS.

W. Vaughen invented the iron notch gun which was one of the best things ever gotten up around a blast furnace. The gun was held in against the furnace with a long wrench. A lot of men would get on this wrench and pull the gun in as tight as they possibly could and then fasten it there. Then the clay was driven. There was no valve between the nozzle and the mud cylinder and that is where the danger to the men comes in. With the wind of the furnace and the suction of the piston on its return stroke or, as I might say, the pressure inside the furnace trying to blow out the clay which has just been driven in and the suction of the piston on the outside pulling it out when the piston is withdrawn to reload, it is bound to come out and burn the men. This happened twice at the Warwick Iron & Steel Co. before I got the mud valve in. Then again it is impossible to hold the gun tight with man power. The clay will squeeze out between the nozzle and the iron hole in spite of all you can do. This machine [shown in the halftone] is gotten up in order to hold the iron notch gun in place while driving the clay. I have also a slide valve in front of the clay cylinder or between the clay cylinder

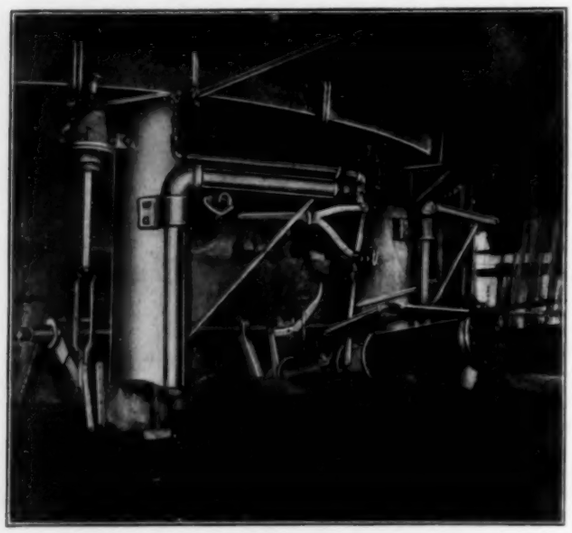


FIG. 3.—THE M'CARTHY METHOD OF HANDLING THE MUD GUN.

and nozzle of the gun. After each load of clay is driven into the tapping hole of the furnace and before the piston is drawn back for recharging, the valve is closed. This is done in order to prevent the men from getting burned. When the cylinder is loaded with clay, the valve is again reopened and the clay is pushed by means of steam into the tapping hole. The valve is again closed and this is done without the least danger to the men and with no loss of time. Every minute lost means money to blast furnace companies and also higher sulphur in their iron."

Fig. 1 is an elevation of the notch gun and Fig. 2 shows a side elevation. A blast furnace of the usual construction is indicated at A, and B is the discharging nozzle of a mud or notch gun. The steam and mud cylinders are coupled by a link section suspended from a crane C. The crane is pivoted in brackets attached to the column and the steam pipes leading to the cylinder are joined by universal unions to permit the swinging of the gun to and from the notch in the furnace. Four way valves to control the mud discharge are illustrated at D in the steam supply pipes and the nozzle of the gun is shut off from the body portion by an improved mud valve. This valve slides in slots and is controlled by a lever. The two columns have bearings for a rock shaft E which has arms F. Two of these arms are separated enough to engage the ears on the mud gun. The rock shaft has another arm F pivoted to a link carried by a lug or finger G on the outer side of the steam cylinder H.

To quote Mr. McCarthy once more as he describes the mud gun shown in Figs. 1 and 2 and the halftone: "My operating cylinder is bolted to one of the columns in front of the furnace by means of a swivel bracket and the cylinder swings on this bracket. The piston rod of this cylinder is fastened to a crank that is attached to a shaft running across the front of the furnace from one column to the other. This shaft has two arms. When the iron is all out of the furnace, the iron notch gun suspended from the crane is swung around to the iron or tapping hole. The operating cylinder bolted on the supporting column is then brought into action. The steam pressure on the piston rod drives down the crank fastened to the cross shaft and the two arms catch the gun and draw it tight against the tapping hole in order to close it. If coke or dirt should get between the nozzle of the gun and the iron hole the pressure is great enough to crush the obstruction and make the nozzle perfectly tight."

Distribution of Stock in the Blast Furnace.

Samuel W. Vaughen and James B. McClure, of Lorain, and Arthur J. Boynton, of Elyria, O., have jointly acquired patents of recent date in charging devices. These include a blast furnace top of peculiar arrangement, a stock collecting car or larry and an improved skip car.

Fig. 1 is a view, partly in vertical section and partly in side elevation, of a furnace top. Fig. 2 is a plan view of the diaphragm and Fig. 3 is a partial plan view of the furnace top with the receiving hopper removed and the valve or diaphragm in a closed position. The bell closing the top of the furnace, seen at A and B, is the beam for operating the bell. C is the receiving hopper which has an elongated discharge throat of comparatively small diameter in which is placed the centrally opening valve D. The throat or funnel is preferably made so that the diameter increases somewhat from the bottom of the hopper to the valve, while below the valve its diameter decreases. This construction allows the stock to readily free itself in falling from the hopper to the valve and in falling from the valve to be directed centrally onto the apex of the small bell E, which is placed a short distance below it. This small bell E is secured to the beam and is surrounded by the collecting hopper F, which is also carried by the beam B. The hopper F is funnel shaped at the lower end to suround the apex of the bell A. The valve D is a circular diaphragm divided into curved triangular sections G, each pivoted at the point H. Every section has a lever arm and these are connected to an annulus by links J, the annulus being supported by friction rollers. When the annulus is turned in the direction of the arrow in Fig. 3 the sections will swing outwardly from the center without interference with each other until their curved edges are nearly coincident with the circle passing through the centers. The opening is constantly symmetrical with the axis of the throat and its diameter increases equally in all directions from the center. The annulus is connected to a motive cylinder K. A skip car L has its bucket hung on trunnions in the frame and has the bucket equipped with a discharge valve of the centrally opening type, as illustrated in Figs. 2 and 3. The stock collecting car is also provided with a similar valve to better ensure the thorough mixture and distribution of the stock.

The features of the system are set forth as follows by the inventors:

"The occasion for this invention was found in the fact that nothing existed, so far as the knowledge of the inventors extended, which in their judgment could be recommended as certain to effect good distribution and which was also economical of labor in operation and of time in repairs. It may be fairly said that this problem of mechanical charging for blast furnaces presents an exception to the usual rule of American metallurgical engineering, in that no thoroughly satisfactory system has as yet been demonstrated, in spite of the fact that men with brilliant reputations, fairly earned, have paid particular attention to it for a number of years. None of them can as yet claim more than partial success. Though it is evident from the long and successful runs of all four of the Duquesne furnaces on their first linings that the Neeland system of charging effects a distribution that is very much more nearly perfect than that effected by any other system as yet subjected to an equally thorough test, yet the Duquesne installation continues to be the only one of its kind and the reason given is the complication of its design, and its high cost in operation. Though most of the other systems in use, which depend on a single or double tipping skip car to give symmetrical distribution, are models of convenience and cheapness in operation, yet not one of them can show a campaign of the length formerly considered usual, under the new conditions imposed by fine ores and rapid driving. The 'hot spot' they have had always with them.

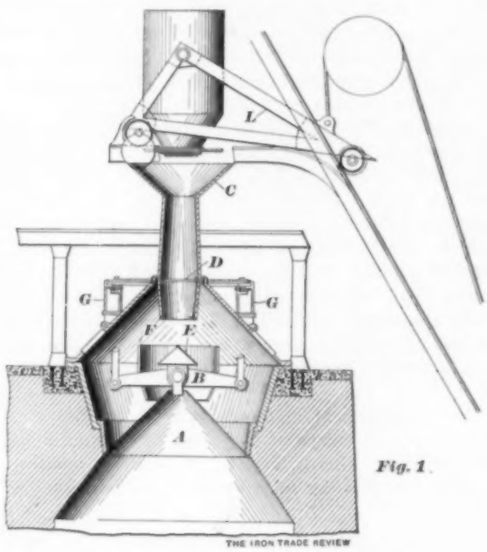


Fig. 1.

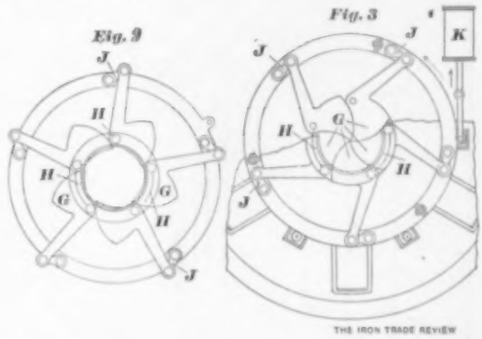
A NEW SYSTEM OF STOCK DISTRIBUTION.

"Beyond all question the changed furnace practice which has come in the last five years has subjected linings to a wear very much more severe than was the case prior to that time, and has made necessary a very much better charging, in order that the wear on the lining be not localized by rapid working of relatively open stock on one side of the furnace. This latter fact has been thoroughly demonstrated by the failure of systems which worked fairly well with the coarse rich ores of the old ranges, to give a distribution which results in even wear of the lining, with the fine sand-like ores of the Mesabi.

"Turning now to the details of these systems, it is evident that their fault is not in the bell and hopper. Seldom has any mechanical device proven more efficient to accomplish a desired object than this combination of cup and cone. Theoretically, it may be desirable to drop the stock into the furnace vertically, instead of with a thrust, as it comes from the bell, in order that a variation in the height of the stock in the furnace shall not be a disturbing factor. Practically its mechanical simplicity and certainty of action both as a gas seal and a distributer make the bell very difficult to improve. The fault with mechanical charging as ordinarily practiced is in the uneven delivery of material on to the bell. The cause of this and the inherent difficulty in ordinary mechanical charging is found in the tipping skip car. No duplication of cars, no system of baffle plates, movable or stationary, can be relied on to put the charged material on the bell as it should be. Under supervision, it may distribute the bulk of the material evenly around the bell, but 'distribution' as used in this connection has reference to chemical composition and physical characteristics as well as mere bulk. With the tipping skip, distribution according to chemical content is impossible, while segregation of the coarse or wet material to one side of the bell is extremely difficult to prevent.

"A consideration of these facts has resulted in the charging system on which patents have just been granted. The basic idea of this system is that the various ores, etc., shall be assembled in horizontal or core-shaped layers, the center or apex of which shall coincide with the central vertical axis of the cylindrical containing bucket of the collecting car, and that each successive discharge of the material shall be through a circular opening, concentric with the cylindrical containing receptacle, either into another cylindrical receptacle whose central vertical axis is coincident with that of the discharging receptacle at the time of the discharge, or onto a bell whose apex is directly underneath the vertical axis of such receptacle. The engravings show the means by which this is accomplished.

"The collecting larry is first filled from an overhead bin through the open deflecting hopper. A number of different systems are now in use which discharge their material in a vertical direction with very little sidewise impulse. Any one of these may be used. The material in the collecting larry is then discharged into the upright bucket of the skip car and from thence, after elevation to the top of the furnace, into the receiving hopper. The vertical position of the skip car bucket is not changed during this operation, its low center of gravity causing it to swing about the trunnions of the car on which it is mounted.



THE STOCK DISTRIBUTER VALVE IN DIFFERENT POSITIONS.

"From the receiving hopper the material is dropped on to the apex of a small bell mounted on the main bell beam and is deflected from the collecting hopper onto the main bell, where it comes to rest, distributed as it should be for the best results in the furnace. The means of discharge from one receptacle to another and the central opening diaphragm furnishes a simple and efficient means for giving the stop the vertical drop demanded. During the moment of its opening, the orifice is a five-pointed star with curved rays; during the time of dropping of practically all the stock it is a perfect circle; the opening being almost instantaneous.

"The mechanical simplicity of the diaphragm cannot fail to commend it to the practical man. No machine fits are required in making repairs; nothing more complicated than a bolt and copper have to be taken apart or reassembled. Only the distances between centers of the linkages need to be exact. The remainder of the removing parts of the apparatus consist principally of pistons and piston rods, members which have been in use on the top of blast furnaces too long to have their efficacy called in question.

"Important as simplicity and cheapness in operation are, and satisfied as the inventors are that in these respects their system is not excelled, yet it is from a metallurgical standpoint that they would present their strongest claims to consideration. Good distribution means large tonnage, low coke consumption, uniform quality of product and long life to the furnace lining. It is believed by the inventors that no system yet demonstrated effects this object so completely and at the smae time so economically as the one under consideration."

Improvements in Mechanical Charging of Blast Furnaces.*

BY DAVID BAKER, PHILADELPHIA.

Our large modern blast furnaces, equipped with ore bins, larries and mechanical means for putting stock into storage, withdrawing it therefrom, and charging it at the tunnel head, are indeed wonderful in capacity; yet, it is admitted that, with some notable exceptions, they have disappointed us in economy—that is, in the items of low fuel consumption, uniformity of product, freedom from slips, and reduced cost of repairs and relining. The manager who estimated the cost of pig iron to be made in a modern plant, by taking the costs of the hand-filled furnace and deducting the amount to be saved by the mechanical appliances, has been surprised in many cases to find that unfavorable results in these items of economy have greatly reduced his expected gains.

Is there any reason why the fuel consumption should be greater for a modern furnace than for an older stack using the same mixture? Certainly the equipment is much more complete, and the trouble, therefore, must lie in the management or in the character of that equipment. Everybody knows that intelligent and vigilant management is a prime requisite; that any neglect of a detail, though it may not be

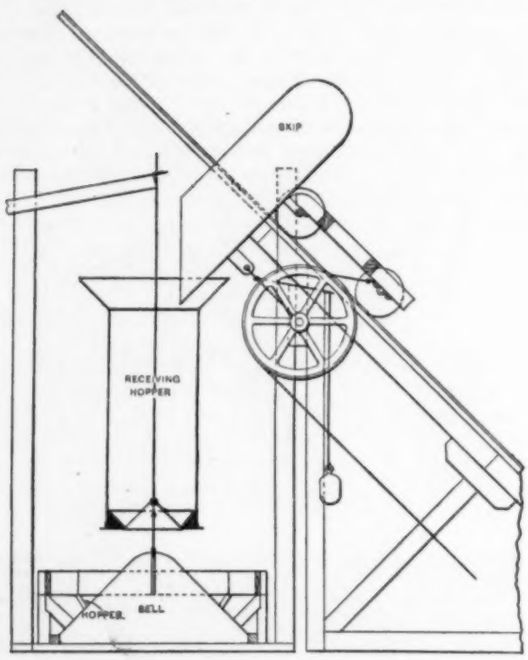


FIG. 1.—SECTION OF SINGLE SKIP.

felt that day or week, will surely sooner or later make its appearance as an increased item of cost. But to hold the furnace manager responsible for the relatively poor work of the modern blast furnace would be, I am convinced, a great injustice. For its management has received much more study and care than was given to the older types. Many furnace managers have lost their health through worrying over this problem, and some have lost their positions, being held responsible for results made inevitable, as I believe, by the equipment provided for them. We should therefore investigate the character of this equipment.

Trouble Starts with Stock Distribution.

The modern stack tends to work irregularly; slips are too frequent and too much "off" iron is made; the furnace "swings" too often and too much. I think it is this irregular working that causes the greater fuel consumption; and according to experience, when a furnace begins to work irregularly, one of the first things to be examined in searching for the cause was the distribution of the stock on top.

When we were filling furnaces by hand, how often was irregular furnace work traced directly to dishonest top-filling.

*Prepared for the Lake Superior meeting of the American Institute of Mining Engineers.

One of the great objects of mechanical filling was not only the saving of labor, but also the elimination of irregular charging, which was known to exist where the work was done by hand. For many years before closed-top furnaces became the rule, we accomplished with the simple bell-and-hopper charger, when honestly handled, a very even distribution of the charge. Each barrow-load of material was dumped in a certain space on the bell, to be changed at the next charge. It was a common practice to charge the coke, stone and ore in layers. But to do so we depended on the honesty of the top chargers; and too frequently in order to save distance in

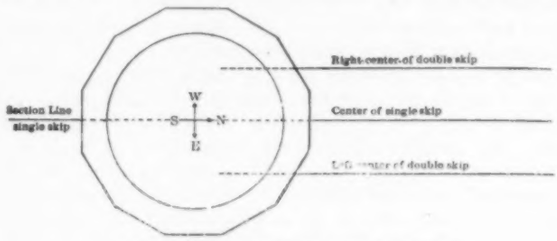


FIG. 2.—PLAN OF BELL AND HOPPER.

wheeling, the larger part of the stock was dumped on the side nearest the hoist, or, to avoid a place where hot gas was escaping from a leak in the bell or hopper, preference was given to the cooler side.

In seeking for a mechanical device for furnace charging, no attempt was made to dispense with the ordinary bell-and-hopper top, but various plans were proposed to utilize the skip hoist, on account of its simplicity and great capacity, by adding some receiving hopper, that should discharge its contents evenly on the main bell and hopper.

The problem is to dump the skip bucket, containing material of different sizes, at a given point on top of the furnace, so that the lumps and fines will be equally distributed around the furnace bell. To accomplish this, sundry contrivances have been constructed, consisting of a receiving hopper into which the skip or skips dump, and which discharges into a circular receptacle a cylinder or frustrum of a cone, closed at the bottom by a small bell, the whole apparatus being placed immediately above the main bell of the furnace. Each different design was supposed to have its special merits, but, in most cases, was simply the result of an effort to avoid somebody's patent.

Another improvement in top-charging is the use of a gas seal to prevent the escape of gas when the charge is lowered into the furnace. This is, in fact, not only an economy, but also a necessity, in order to protect the superstructure on the furnace.

Skip Hoist Experiments.

In 1890, before the form of top for Furnaces No. 9 and No. 10, then under construction at the South Works of the Illinois Steel Co., had been determined, I made a half-size model of a furnace top of the double-bell type, arranged for ex-

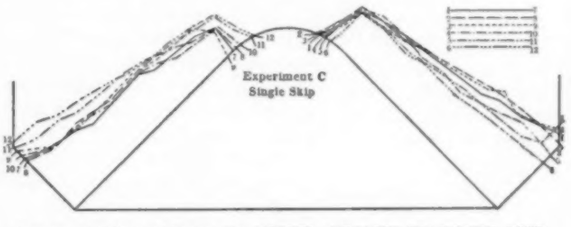


FIG. 3.—PROFILE OF ORE IN HOPPER, CHARGED BY SINGLE SKIP.

periments with the single or double skip, under conditions approximating as closely as possible those of full size. Fig. 1 shows the model in elevation and Fig. 2 a plan of the hopper. The hopper, instead of being circular in section, was made up of 12 plane sides and divided into 12 equal spaces by partitions made of thin wood.

In using this model, no experiments were tried with coke, or stone. A study of the distribution of the ore, it was thought, would be a guide as to the distribution of the limestone and coke. The ore charge used was a proportional part of the charge then being filled into Furnace No. 5 of the

Illinois Steel Co. corresponding to the area of the hopper of the model, when compared with a furnace of twice the diameter, and consisted of:

Ore.	Pounds.
Fayal	1,937
Lake	655
Pewabic-Genoa	417
Champion	715
Chapin	327
Blue-billy	149
Total	4,200

The Champion lump ore and the Pewabic-Genoa ore were broken down to half size.

Three experiments were made with the single skip, A, B, C, in which the ore was charged in the following order: Blue-billy at the bottom of the skip bucket; then Chapin, Champion, Pewabic-Genoa, Lake, and Fayal ore. After dumping the skip, the ore occupied generally, in the cylinder, of course, the reverse of its previous order in the skip; but the blue-billy was on the north side, next to the skip. In dumping this charge from the cylinder into the main hopper, the blue-billy was found to be all in the spaces 1, 2, 3, 11 and 12—fully 40 percent of it being in division 1, and the rest in gradually decreasing amount from the center of No. 1 to the right and left (see Figs. 3, 4 and 5), of which the latter

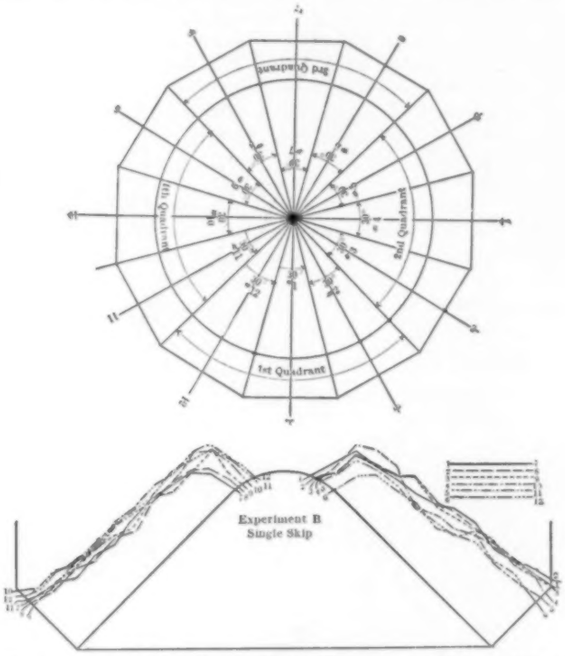


FIG. 4.—PLAN OF DIVISIONS IN HOPPER AND PROFILE OF ORE IN HOPPER, CHARGED BY SINGLE SKIP.

shows also the profile of the ore in the cylinder when a single skip is used. In the main hopper, the ore was apparently heavier on the side next to the skip, and lighter on the opposite side. The hard ore seemed about evenly distributed.

For the double skip trials it was necessary to increase the width of the hopper which received the discharge from the two skips. Three experiments, A, B and C, were tried, in which the skip car was filled as follows:

EXPERIMENT A.		EXPERIMENT B.		EXPERIMENT C.
Left load.	*Right load.*	*Left load.*	*Right load.*	
.....	Blue-billy	Blue-billy	.....	Same as A.
.....	Chapin	Chapin	.....	
Fayal	Champion	Champion	Fayal	
.....	Pewabic-Genoa	Pewabic-Genoa	....	
.....	Lake	Lake	....	

Fig. 6 shows the profile of the ore in the cylinder in experiments A and B. Figs. 7, 8 and 9 show the profile of the ore in the main hopper trials A, B, C. In these experiments the blue-billy seemed to be mixed up with the other ore, and its distribution could not be clearly traced.

It was noticed, however, that the smallest deposit of ore in the main hopper corresponded to the smallest deposit in the cylinder. This is the reverse of the condition shown in the trial of the single skip. Moreover, there was with the single skip more complete separation of the lumps and fines. Some trouble was experienced in all the experiments from the "bridging" of the ore in the cylinder; but in practice no such effect has been noticed with a cylinder of twice the diameter. In order to ascertain the distribution of the lumps in the main hopper, the ore in each compartment was screened through a 1-in. mesh sieve.

Table I. shows the distribution of the ore in weight. The

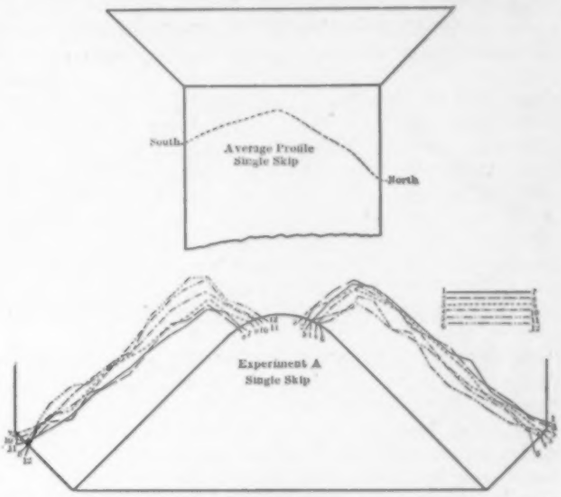


FIG. 5.—PROFILE OF ORE IN CYLINDER AND IN HOPPER, CHARGED BY SINGLE SKIP.

compartments are numbered, beginning on the side next to the skip.

Table II. shows the weights figured by quadrants, and III. shows these figures expressed in percentage, while Fig. 4 shows the variation alone and below the average in each case. Taking quadrants 1 and 3, that is, the ore under the skip and that opposite, in the column showing the difference in the weight of total ore in Table IV., when using the single skip, we find 261 lb. difference in weight, or 6.12 percent, while between the other two quadrants there is only 17 lb. difference, or 0.42 percent. In the case of the double skip quadrants Nos. 1 and 3 shows 208 lb. and 2 and 4, 78 lb., or 5.09 percent for 1 and 3, and 1.85 percent difference between 2 and 4, but when we take the rights and lefts together, with the double skip, the difference shows as 18 lb. between 1 and 3 and 86 lb. between 2 and 4, or 0.42 percent between 1 and 3 and 2.10 percent between 2 and 4, so a great advantage is obtained by changing the hoisting of the charge from left to right and vice versa.

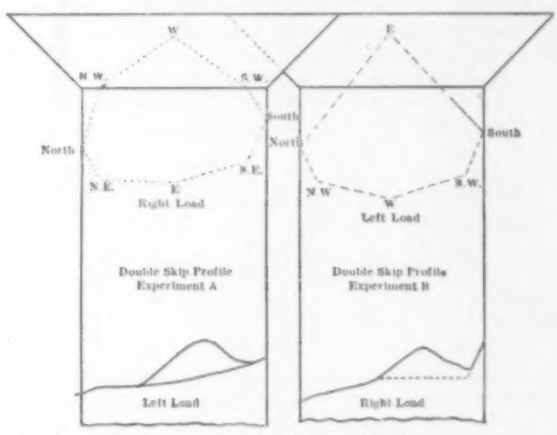


FIG. 6.—PROFILE OF ORE IN CYLINDER, EXPERIMENTS A AND B.

Now, if we look at the lump columns, we see a difference in case of single skip of 121 lb. between quadrants 1 and 3 and 4 lb. between 2 and 4. In case of double skip 42 lb. between 1 and 3, and 18 lb. between 2 and 4, showing in rights and lefts 28 lb. difference between 1 and 3 and 54 lb. between 2 and 4. This shows that the double skip makes a better distribution than the single, and that the distribution of the double skip, while better, is not correct when changing

the hoisting of the ore from right to left. Inasmuch as the speed of hoisting with the model was 20 ft. per min., a more rapid rate should prevent in a great measure the separation of the lumps and fines.

Conclusion.

From these experiments it is evident that the double skip gives a more even distribution of the lumps and fines than the single skip. As a matter of fact, the double form has been most widely adopted. As a result of our experiments, we therefore consider the distribution with the double bell good enough for our practice, counting upon the more

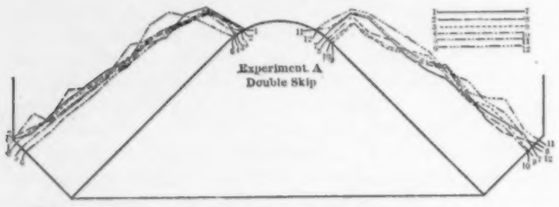


FIG. 7.—PROFILE OF ORE IN HOPPER, CHARGED BY DOUBLE SKIP.

rapid dumping of the actual furnace skip to prevent sorting of the material and to make up for defects of distribution developed in experimenting with the model.

As soon, however, as the furnaces provided with the double bell were started, it became apparent that most of the lumps were being thrown to the side opposite the skip; and, though deflectors were promptly placed in the receiving hoppers, the results have been unsatisfactory; the life of the linings (which cut out on the side opposite to the skip) has been short; and this is the history of nearly all double-bell chargers. Some of them cause the furnaces to cut out faster than others, by reason of local conditions, such as the physical condition of the coke, limestone and ore; but with practically all of them the lining tends to wear faster on one side—in the majority of instances, the side opposite to the skip. It may be replied that this is not true of the Duquesne furnaces, and I must admit that very creditable work has been done there with the double bell. The reason seems to me apparent. The skip at these furnaces does not dump, but discharges from the bottom over a small bell. This is a potent preventive of "sorting;" the most important fact is that the same skip bucket is filled in the stockhouse from two opposite sides. If it were filled by chutes on one side, the sorted lumps would roll to one side and eventually land in the furnace on that side. If the skip bucket at Duquesne could be filled from four equidistant points of a circle, the distribution would be still better. A still simpler device might perhaps secure the desired purpose.

Destruction of Linings.

Furnace managers have been perplexed as to the cause of the rapid destruction of linings in modern blast furnaces. By some the blame has been placed on the quality of the fire brick used. They say we are not getting as good fire brick as when there was more competition among brickmakers.

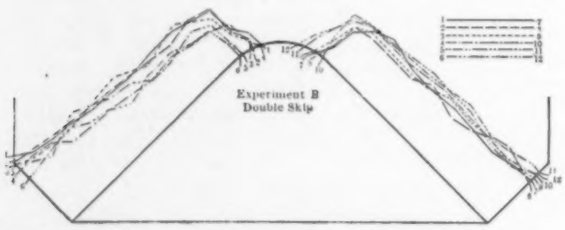


FIG. 8.—PROFILE OF ORE IN HOPPER, CHARGED BY DOUBLE SKIP.

Whatever foundation there may be for this statement, it is surely not possible for all the worst bricks to be laid on one side of a furnace; and there has been no complaint about the durability of the bricks used in the hearth and bosh; therefore I believe we must look elsewhere for the source of the trouble.

An effort has been made to overcome the excessive wear of the lining by placing cooling plates in the lower part of the in-wall, the excessive wear being often first manifested at a point 15 or 20 ft. above the top of the bosh. I do not, however, believe that this excessive wear can best be prevented in that way. To my mind, the working hot on one side of the furnace indicates an interior condition calling for more than an external remedy.

Experience at Sparrows Point and Sydney.

In my experience I have found that wherever the filling gave a column of lumps on one side of the furnace, at that point the wall would cut away. Some years ago the blast furnaces of the Maryland Steel Co. were filled by a car system which dumped a ton of ore in a conical pile at four

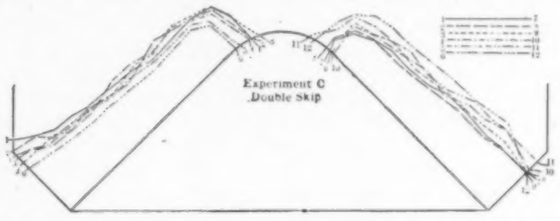


FIG 9.—PROFILE OF ORE IN HOPPER, CHARGED BY DOUBLE SKIP.

equidistant points to the hopper. When the first furnace filled by this method was blown out, the in-wall was found to have been cut into rectangular shape; the corners of the rectangle being directly under the equidistant points between the piles of ore in the hopper. It was at these points that the lumps rolled, forming four chimneys of coarse stock in the furnace, through which the gas channeled. It is needless to add that the furnace work of this stack, before blowing out, was decidedly unsatisfactory.

My experiments at Sydney, given in my paper on "Stock Distribution and Its Relation to the Life of a Blast Furnace Lining," read at the Atlantic City meeting of the institute, show that this cutting may be remedied by changing the distribution on top. Now, since these troubles are not the rule with hand-filled furnaces, they must be due to the distribution of the stock in the mechanically-filled furnaces.

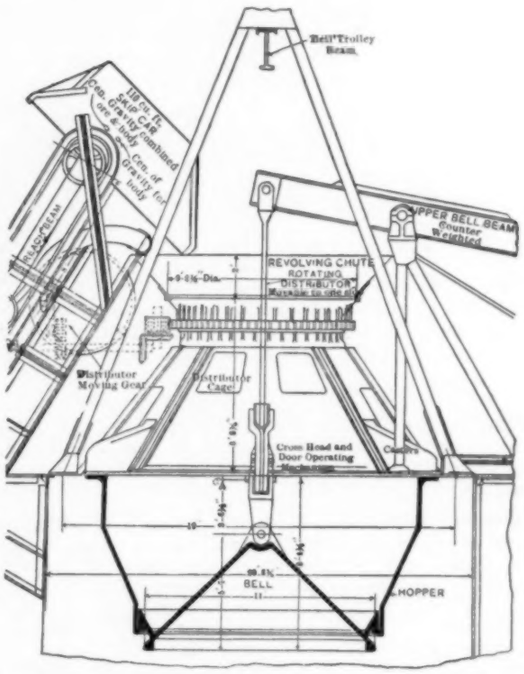


FIG. 10.—DISTRIBUTER AND SINGLE SKIP WITH DOUBLE BELL ROD.

Many managers argue, however, that the furnace worked well enough until the shell got hot. To this, I would reply that the bad effect of unequal stock distribution is cumulative, and becomes more evident with growing irregularity in the wall. What may first appear as increased fuel consumption only, develops later into casts of "off" iron.

If bad stock distribuiton may cause irregular wear of the furnace lining, what have we lost in changing from hand-filled to machine-filled furnaces? Is it possible to dis-

tribute the stock evenly, both as to quality and quantity, by mechanical means, and if so, how? I have seen mechanically-filled furnaces in which, so far as distribution of quantities was concerned, nothing better could be desired, and yet the cutting action on the in-wall was excessive. The quantity being equally divided, the only other thing to look for is the mechanical quality. Are the lumps and fines equally divided in the distribution? In hand-filling there is a rotation of the stock, buggies being moved around to new points at each charge. It is this rotation which I regard as vital, and as having given the satisfactory results of hand-filling.

In watching on the top of the ordinary skip-filled furnace, with double-bell charger, the distribution of the stock, it will be noted that dry material, moving with a higher velocity than wet, is thrown farthest in dumping; and, moreover, that lumps have also a higher velocity than fines. This applies also to the coke, in which braize is always present, especially

TABLE I.—AVERAGE ORE-WEIGHTS, POUNDS.

30° Divisions of Hopper	Ore Held by 1" M. Screen			Ore Passing 1" M. Screen			Total Ore		
	Skip			Skip			Skip		
	Single	Double	R. and L. Double	Single	Double	R. and L. Double	Single	Double	R. and L. Double
1	143	133	126	237	279	269	380	412	395
2	155	122	115	240	250	251	395	372	372
3	141	124	120	252	229	240	393	353	360
4	144	150	145	237	265	262	381	415	407
5	117	114	110	199	202	196	316	316	306
6	104	114	127	173	197	211	277	311	338
7	96	104	103	184	207	209	280	311	312
8	94	104	104	201	173	174	295	273	278
9	118	110	111	199	190	184	317	300	295
10	141	141	152	234	220	218	375	361	370
11	140	120	126	241	227	222	381	347	348
12	117	106	106	212	214	218	329	320	324
All	1,510	1,438	1,445	2,609	2,653	2,660	4,119	4,091	4,105
Average	126	120	120	217	221	222	343	341	342

TABLE II.—TABLE I. CONSOLIDATED TO QUADRANTS.

This Consolidation Reduces Errors of Division—Errors in Weights, 50 per cent.

Quadrants	Ore held by 1" M. Screen			Ore Passing 1" M. Screen			Total Ore		
	Skip			Skip			Skip		
	Single	Double	R. and L. Double	Single	Double	R. and L. Double	Single	Double	R. and L. Double
First	415	361	346	689	743	744	1,104	1,104	1,090
Second	402	388	375	688	686	698	1,090	1,084	1,073
Third	294	318	335	558	577	593	852	895	928
Fourth	399	371	389	674	637	625	1,073	1,008	1,014
All	1,510	1,438	1,445	2,609	2,653	2,660	4,119	4,091	4,105
Average	378	359	361	652	663	665	1,030	1,023	1,026
Above by Percentages									
First	10.07	8.82	8.43	16.74	18.16	18.12	26.81	26.98	26.55
Second	9.76	9.48	9.13	16.70	17.01	17.00	26.46	26.49	26.13
Third	7.15	7.78	8.16	13.54	14.11	14.45	20.69	21.89	22.61
Fourth	9.68	9.07	9.48	16.36	15.57	15.23	26.04	24.64	24.71
Total	36.66	35.15	35.20	63.34	64.85	64.80	100.00	100.00	100.00
Average	9.16	8.79	8.80	15.84	16.21	16.20	25.00	25.00	25.00

after the repeated handlings to which coke is subjected in the modern filling device. As the skip goes up the incline, this dirt is all shaken down, follows in dumping the bottom contents of the skip, and is therefore deposited immediately below the dumping point. In other words, we have in the dumping skip and receiving hopper of the usual double-bell charger a very efficient sorter, depositing the fines in one place and the lumps in another.

To correct this, many devices, such as adjustable chutes, deflectors, etc., have been tried without completely removing (though some may have mitigated) the difficulty. One of the most common is the long cylinder placed immediately below the receiving hopper. The smaller the diameter of this cylinder the more effective will be its aid; but there are practical limits to the reduction in diameter of this cylinder, and hence it never fully secures a perfect proper distribution of stock.

In the majority of cases, the larger part of the lumps reach the side of the furnace opposite to the skip, causing the gas to channel in that direction, and raising the melting-point on that side; since the other side, not having received so much gas treatment, is not so soon ready for the hearth. Hence the furnace works cooler on that side, and tends to "build up" on the walls, and to "scaffold" there, by reason of the larger quantity of fine ore and coke there present.

Gas Channeling from Irregular Distribution.

Unquestionably, one of the most potent causes of slips and irregular product is the gas channeling, caused by irregular distribution of the fines in the furnace, and the consequent presence, inside the stack, of two separate smelting operations—the process on the side having the most lumps progressing faster than the one on the other side, where there are more fines. I have heard metallurgists claim that the slips and irregularities under consideration are due to the great volume of blast in the modern stack; but I have always found that the more uniform results are to be obtained by keeping the furnace busy, and I always looked for irregularity when obliged to reduce materially the quantity of the blast.

But if, in the same furnace, two separate smelting operations are going on (one side being hotter than the other), increase of the blast beyond a certain volume will simply bring the cold side down too fast; the furnace will scour on one side; iron oxide will go into the cinder; and some

TABLE III.—COMPARISON BY PERCENTAGES OF THE ORE HELD BY AND PASSING 1" M. SCREEN.

Quadrants	Total Ore Held by 1" M. Screen—1			Total Ore Passing 1" M. Screen—1		
	Skip			Skip		
	Single	Double	R. and L. Double	Single	Double	R. and L. Double
First	27.48	25.11	23.94	26.41	28.01	28.00
Second	26.62	26.88	25.95	26.37	26.23	26.24
Third	19.47	22.11	23.19	21.39	21.75	22.29
Fourth	26.43	25.80	26.92	25.83	24.01	23.47
Total	100.00	100.00	100.00	100.00	100.00	100.00
Average	25.00	25.00	25.00	25.00	25.00	25.00

Variables	Single Skip Experiments			Single Skip Experiments		
	A	B	C	A	B	C
Ore	Frozen	Char'd and released, wet / Divided and weig'd frozen	Damp	Frozen	Damp	Wet
Weather	Freezing	C. and F., rainy / D. and W freezing	45° F., dry.	Freezing	40° F., mild	45° F., showers

accumulations on that side may fall. As a result, the furnace may become cold, and some tuyeres may be lost.

There is nothing to determine the course of the gas currents, as they pass upward from the melting zone in the furnace, except the lines of least resistance; and, if most of these are on one side of the furnace, that side will get most of the gas and will consequently "work hotter." It can readily be seen that a slight difference in resistance, if constantly in one direction, will result in diverting the gas currents, thus causing irregular furnace work, slips, scaffolds and cutting of the in-wall on the hot side. In my judgment, the only radical cure of this trouble is the different distribution of successive charges, preventing the segregation of the lumps on any one side of the furnace.

From a faulty distribution comes a great train of evils; higher fuel consumption, irregular work, slips, and rapid destruction of the furnace lining. Correct the distribution and diminish the breakage of coke, and the modern stack will do better work in every particular than the older hand-filled furnace, yielding a fair return obtained for the money invested in labor saving appliances.

After long investigation of the mechanical filling of blast furnaces, I am satisfied that it is impossible to obtain a satisfactory distribution of the stock with the double-bell charger and dumping skip, however varied with deflectors, adjustable

chutes, reducing hoppers, or any other mechanism depending for adjustment, etc., upon an operator.

After my paper on my experience at Sydney was written, the furnace which had the latest improvements in top charging gave signs of the burning out of the in-wall on one side, showing that these improvements, though helpful, had not completely remedied that trouble.

The Brown Distributer.

In searching for some means of duplicating hand-filling mechanically, I concluded that, since the skip could not readily be rotated about the furnace top, like the barrow in hand-filling, we must try to rotate the furnace top so as to produce the same effect—in other words, to obtain the advantages of hand-filling and avoid its disadvantages, by making an automatic arrangement, working in unison with the skip hoist and not dependent upon an operator.

The top invented some years ago by Alex. E. Brown, of Cleveland, answers all these conditions. Here a revolving hopper is operated by the skip hoist rope-wheel. This hopper, provided with a wide chute, is moved into position while the empty skip is descending; a ratchet arrangement in the drive preventing any movement in an opposite direction. This device, which may be used with single or double skip, directs each skip load into a different section of the hopper. For instance, the coke charge may be sent up in four skips and deposited in four equidistant parts of the hopper, thus making, owing to the wide discharge nozzle, a complete ring of coke in the hopper. After the coke has been lowered into the furnace, the ore and limestone are sent up in the next four skips, thus making a complete ring of ore and limestone in the hopper. Now to make this arrangement even better than hand-filling, this hopper, instead of moving just 90 degrees between skip loads, is moved, say 4 degrees more, so that the material of one charge is dumped in a slightly different place from the same material in the preceding charge. Thus, if 8 skip loads make a complete charge, the first ore of one charge will be dumped at a point 32 degrees from that of the first ore of the preceding charge, and so on. It is this adjustable precision of the distribution which makes the apparatus valuable. The breakage of coke or ore is relatively small; for the hopper chute is kept as close to the main hopper as possible, and this distance may be cut down below 10 ft.

This charger was patented before the mechanical filling of blast furnaces became the general practice; and the furnace managers of that day, while recognizing almost universally the theoretical value of Brown's invention, thought it involved too much mechanism for a blast furnace; and the double bell, by virtue of its simplicity, became the most common type. Now, however, the serious defects of the double-bell charger have been demonstrated, while on the other hand Brown's device has been simplified. Fig. 10 shows its present form for the single skip, with the double bell rod. The whole of the gas seal and distributor is on wheels, and can be jacked up and run to one side, as shown by dotted lines in the figure, when repairs must be made to the main bell-and-hopper.

The gas seal door is open, except when the bell opens. Then the first three inches' travel of the main bell allows the door to drop shut, and the top is sealed. During charging, the door, being open, allows the stock to flow freely out of the chute and gives a more uniform distribution in the main hopper.

Fig. 11 shows a distributor applied with the double skip. No superstructure is required over the top of the furnace except what is necessary to handle the bell for repairs. Fig. 12 shows the revolving hopper or chute removed from the gas seal cage and support. Fig. 13 shows the gas seal cage, which is made of reinforced steel plate in this case, but is sometimes made of cast iron where preferred.

In the earlier forms the revolving hopper was supported on wheels, and later on steel balls. In the present form all these are dispensed with, and the flange of the hopper simply slides at the top of the gas seal, on a surface of cast iron against cast iron, about 8 in. wide, and lubricated only with graphite. This arrangement, contrary to prediction, has been found to show practically no wear after a year's use. If they will last through a blast, the arrangement will have served its purpose well; and it seems, under actual trial, to be entirely capable of that degree of durability. The flue dirt does not seem to enter the joint to any extent. I believe the reason lies in the fact, already noted, that the gas seal door is only closed when the main bell is open. The pressure on the sliding surfaces is only about 10 lb. per square inch, and the friction under that load cannot be great.

This distributing top has passed beyond the experimental stage and has shown itself in practice to possess the advantages, without the disadvantages, of hand-filling. In all the furnaces where it has been installed, it has reduced the slips and prevented the irregular wear of the in-wall. There are indications that it will show a marked saving in fuel; but the data for comparison in this respect are not yet sufficiently complete for publication.

If the present prospect of technical efficiency should be confirmed by longer use, only one further improvement will be required, to secure results superior in economy to those obtained by hand-charging—namely, an arrangement of bins and apparatus for handling coke which will do away with the excessive production of dust involved in present methods of storage and rough handling and re-handling of this fuel. This subject has been treated in my paper on "Stock Distribution," already cited.

TABLE IV.—VARIATION FROM EVENLY DISTRIBUTED. + ABOVE. — BELOW. BY WEIGHT.

Quadrants	TABLE 2. Ore Held by 1" M. Screen, Skip			Ore Passing 1" M. Screen, Skip			Total Ore, Skip			TABLE 3. Ore Held by 1" M. Screen, Skip			Ore Passing 1" M. Screen, Skip		
	Single	Double	R. and L. Double	Single	Double	R. and L. Double	Single	Double	R. and L. Double	Single	Double	R. and L. Double	Single	Double	R. and L. Double
First	+37	+ 1	—15	+37	+80	+79	+ 74	+ 81	+64	+37	+ 2	—15	+37	+79	+79
Second	+25	+29	—26	+35	+33	—72	+ 60	+ 62	—91	+24	+29	—26	+36	+33	—72
Third	—84	—41	+13	—94	—86	+33	—187	—127	+46	—83	—41	+13	—94	—86	+33
Fourth	+21	+11	+28	+22	—27	—40	+ 43	— 16	—12	+22	+11	+28	+21	—27	—40
Above by Percentages.															
First	+ .91	+ .03	—.37	+ .90	+1.95	+1.92	+1.81	+1.98	+1.55	+2.48	+ .11	—1.06	+1.41	+3.01	+3.00
Second	+ .10	+ .70	—.64	+ .86	+ .80	—1.75	+1.46	+1.50	—2.39	+1.62	+1.98	—1.81	+1.37	+1.23	—2.71
Third	—2.03	—1.01	+.33	—2.28	—2.10	+ .80	—4.31	—3.11	+1.13	—5.53	—2.89	+ .95	—3.61	—3.25	+1.24
Fourth	+ .52	+ .28	+.68	+ .52	— .65	— .97	+1.04	— .37	— .29	+1.43	+ .80	+1.92	+ .85	— .99	—1.53
Variation Between Opposite Quadrants by Weights.															
First and third	1.21	.42	.28	1.31	1.66	.46	2.61	2.08	.18	1.20	.43	.28	1.31	1.66	.46
Second & fourth	.04	.18	.54	.13	.60	.32	.17	.78	.86	.02	.18	.54	.15	.60	.32
Preceding by Percentages.															
First and third	2.92	1.04	.70	3.20	4.05	1.12	6.12	5.09	.42	8.01	3.00	2.01	5.20	6.26	1.76
Second & fourth	.08	.41	1.32	.34	1.44	.78	.42	1.85	.10	.19	1.18	3.73	.54	2.22	1.18

Cincinnati Machinery Market.

CINCINNATI, Oct. 3.—The general tone in the machinery trade of this city is better, although there has been no marked increase in orders. Somewhat greater activity of the shops is noted, but the most encouraging feature of the situation lies in the number of specifications that are being figured on. Railroads lead in these inquiries and lists from about ten railroad companies are in the hands of machine tool men for bids. The inquiry is not confined to railroads, however, and some of the Eastern agents report more general inquiry for tools than at any time for more than a year. Export trade seems to be less of a feature now than for some time. Some South American orders for motor drives furnish indication that manufacturers in that part of the world are awake to the need of supplying themselves with modern machinery. Some of the shops are quite busy and some night work has been started under temporary necessity for such action. There are more shops running full time since Sept. 1 and the number of operatives is steadily increasing. The outlook for trade during the fall and winter is regarded most hopefully by those in the machine tool lines. The demand for lathes, or rather the inquiry for them seems to indicate that an especially good business may be looked for in that line. The higher cost for the most improved machines as compared with the old types is something of a check on the buying of the latest models with motor drives and other features, but the manufacturers have confidence that the advantages of the new machines will commend themselves to the buyers of machine tools and that the old types will not successfully compete with the new, because of the cheaper first cost of the machine, after the effectiveness and economy of the new types become known.

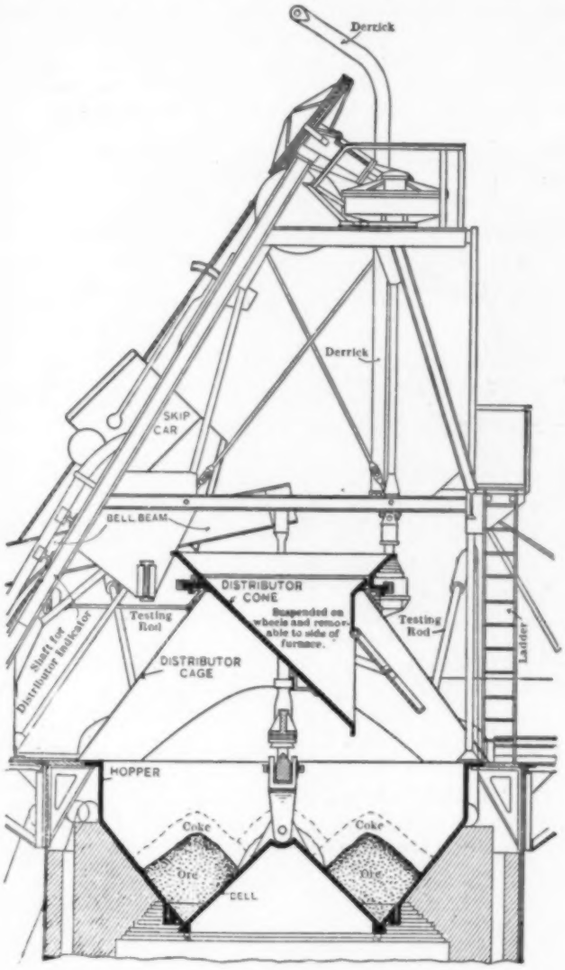


FIG. 11.—A DISTRIBUTER AND A DOUBLE SKIP.

The American Tool Works Co. notes a gratifying increase in orders the past month, especially for lathes. Some export business has been booked and some South American orders for motor drives have been received which shows that manufacturers there are awake to modern needs.

The Cincinnati Planer Co. is now running full time and has been since Sept. 1 and orders are coming in quite satisfactorily. The company believes business in machine tool lines is picking up and regards the outlook as favorable for a good trade this fall and winter. The new variable speed planer is gaining in popularity.

FIG. 12.—SIDE VIEWS OF BROWN DISTRIBUTER AT RIGHT ANGLES TO EACH OTHER.

The Lodge & Shipley Machine Tool Co. reports improvement in orders and inquiry and outlook good for the future. The larger concerns lead in the buying but still there is a gratifying increase from miscellaneous sources.

The Cincinnati Milling Machine Co. is running fuller all the time. The company has more specifications now in hand than at any time for more than a year, and finds the inquiry general in its scope, covering all lines of shops that use milling machines.

FIG. 13.—VIEW OF BROWN GAS-SEAL CAGE.

Greaves, Klusman & Co. find business picking up in the machine tool line and report a good outlook for the immediate future. Mr. Klusman has just returned from a Western trip, which resulted in some satisfactory business.

The Streit Machine Tool Co. notes no particular change in conditions. Business holds up fairly well but is somewhat spasmodic—orders good one week and rather few the next, but in the aggregate there is enough coming along to keep the shop busy.

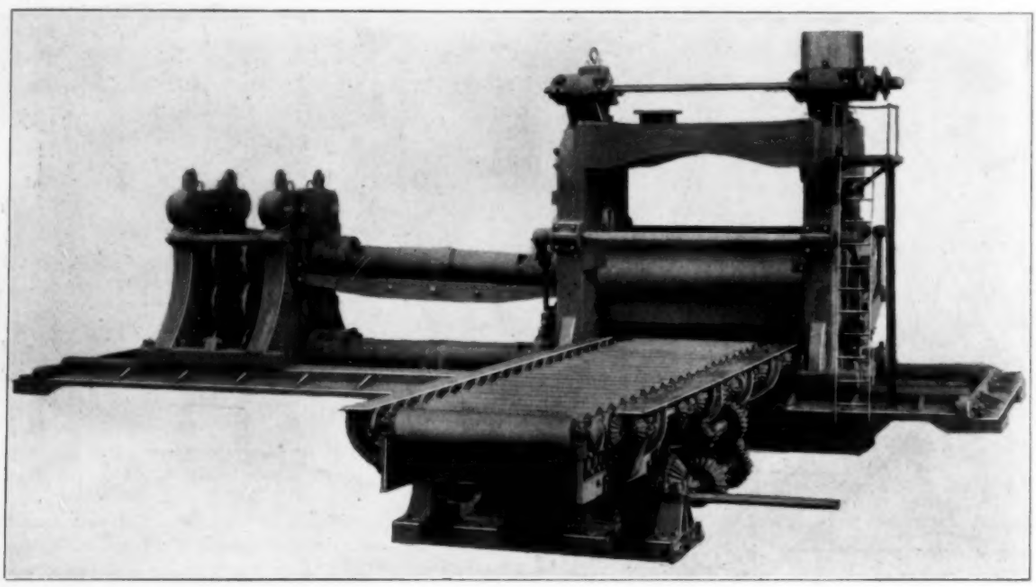
The Sebastian Lathe Co. reports business picking up in a quite encouraging way and the outlook good.

The Cincinnati Metal Trades Association has held no important meetings during the summer and after a long period without getting together in either a business or social way the announcement of the first quarterly dinner of the winter season has created unusual interest. The arrangements for the dinner are being made by F. A. Geier, of the Cincinnati Milling Machine Co.; Benj. Sebastian, of the Sebastian Lathe Co.; B. B. Quillen, of the Cincinnati Planer Co.; Phil. Fosdick, of the Fosdick Machine Tool Co., and F. L. Moyer, of the Lunkenheimer Co. William Lodge, of the Lodge & Shipley Machine Tool Co., has been selected as toastmaster for the occasion. The dinner will take place at the Business Men's Club, on Oct. 6. The speakers will be Fred. J. Miller, editor of the *American Machinist*, whose subject will be "Innovation;" F. B. Dyer, superintendent of public schools, and John Shearer, superintendent of the Ohio Mechanics' Institute, who will speak on "Manual Training in Our Public Schools;" W. P. Eagan, commissioner of the National Metal Trades Association, will give an address on his association's work in the recent machinists' strike in Chicago.

A NEW PLATE MILL.

The illustration shows a 128-in. plate mill recently built by the United Engineering & Foundry Co., of Pittsburg, for the Dominion Iron & Steel Co., of Sydney, Cape Breton, Canada. This mill is driven by a 54 x 60-in. Southwark engine. The general design represents the most modern practice of plate mill work. The top and bottom rolls are 34-in. diameter by 128-in. long over the body of the roll, with necks 24-in. in diameter by 20-in. long. The middle roll is 20½-in. in diameter with necks 14-in. in diameter by 19-in. long. The top and middle rolls are counterbalanced by means of hydraulic cylinders carried on the roll housing, while the screw down for operating the top roll is operated by an electric motor on the top of the housings, with worm and worm wheels driving the screws, which run in gun iron screw boxes, the top roll having a lift of 18 in.

The roll housings are made from charcoal air furnace iron and weigh 70,000 lb. each. The pinions, leading and intermediate spindles and coupling boxes are all made of open-hearth steel castings, the pinions having 13 teeth, 7.24-in. circular pitch, and are 36-in. pitch diameter by 48-in. face. The pinion housings are charcoal air furnace iron castings, weighing 40,000 lb. each. The pinion bearings are babbitted steel castings, while the roll bearings are of bronze.



A 128-IN. PLATE MILL.

The bed plates for this mill are very heavy charcoal air furnace iron castings and are designed to give ample bearing surface on the foundations, thus making the mill absolutely rigid.

The tables are designed to tilt by means of hydraulic power, while the rollers are driven by electric motors. These rollers are steel castings on forged steel shafts and are spaced 16-in. and 16½-in. centers. The bearings for the rollers are bronze bushed. The total length of each table is 30 ft. All the driving gears are steel castings, the frame of the table being made up of rolled steel plates 24-in. wide by 2½-in. thick, securely bolted to separators, the whole carried on trunnion bearings of ample size.

The entire puddling department of the lower plant of the Carnegie Steel Co., Youngstown, O., is now in operation. The company has experienced little difficulty in securing puddlers to take the places of the strikers, and it is probable that the puddling furnaces at Girard will soon be placed in operation.

None of the heirs to the Bernville Foundry, Reading, Pa., having appeared to accept the property at the appraised value of $3,000, the plant will be sold at public sale in about a month.

Blast furnace G of the Edgar Thomson plant of the Carnegie Steel Co., Braddock, Pa., was placed in operation last week. This stack has been out for several months receiving a new lining and undergoing extensive repairs.

William Goelet, representing the Vermont Scale Co., Burlington, Vt., was in Nashville, Tenn., last week, negotiating for the establishment of a plant for the manufacture of scales. The Vermont company is a large concern and manufactures scales of all sizes.

The last of the open-hearth furnaces of the Lackawanna Steel Co., at Buffalo, N. Y., was placed in commission last week. There are six furnaces in the plant. The structural mill has been in operation about two weeks.

The National Malleable Castings Co. has received an order from the New York & New Jersey Railroad Co. for the delivery of 3,000 tons of malleable castings.

Ed C. Rainey, of Eatonton, Ga., has bought the Harwell Machine Works at Covington, Ga., and will take charge at once.

PROFITS OF BRITISH COMPANIES.

The London *Economist* presents a tabulation of the operating results of several British iron and steel companies, as follows:

	1903-4 Net Profit.	Div., P. C.	1902-3 Net Profit.	Div., P. C.
Coal Companies.				
Briggs (Henry), Son & Co..	£57,832	18⅓	£46,442	15
Main Colliery	22,714	15	49,889	20
Pease & Partners	11,982	3	94,550	8
	£92,528		£190,881	
Iron, Steel and Engineering.				
Bolckow, Vaughan & Co....	£199,641	5	£278,748	5
Guest, Keen & Nettlefolds..	333,473	10	340,479	10
Howard & Bullough.....	73,569	7	80,121	8
Lochgelly Iron & Coal.....	13,740	7½	19,210	10
Normanby Iron Works.....	4,351	Nil	2,315	Nil
Palmer's Shipbuilding & Iron	53,864	5	54,785	5
Pearson & Knowles.....	46,748	3	53,427	4
Richard Hill & Co.....	11,451	5½	10,107	5½
Sheepbridge Coal & Iron....	69,384	7½	76,142	10
Sheffield Forge & Rolling Mills	7,320	5	8,752	7
Sir W. G. Armstrong, Whitworth & Co.....	501,687	15	486,020	15
Staveley Coal & Iron.....	93,974	7½	132,580	10
Steel Co. of Scotland.....	16,077	2½	16,800	2½
Walter Scott	36,930	5	49,543	9
Weardale Steel, Coal & Coke	59,216	6	58,185	6
Workington Iron.....	16,186	8¾	13,786	6
	£1,537,611		£1,681,000	

Buffalo & Susquehanna Iron Co.

One of the stacks of the Buffalo and Susquehanna Iron Co., Buffalo, was blown in Sept. 28, every detail of the blowing-in going off to the satisfaction of the manager, Hugh Kennedy. The two furnaces represent the most advanced step in modern blast furnace construction. The works are located on the outer harbor at South Buffalo, opposite the Lackawanna Steel Co. Each furnace has a daily capacity of 400 tons of pig iron. Wm. A. Rogers is president of the company, whose product will be handled by Rogers, Brown & Co. Both stacks were completed and ready to go, but as the plant is laid out for receiving its ore by lake and the slip which is built up to the furnace, it is considered unwise to attempt to run both furnaces through the rigors of a Buffalo winter under the necessity of bringing the ore in by cars from neighboring docks. The Lehigh Valley railroad, whose Tift Farm ore docks are less than a mile away, has allowed the furnace company space for its stock piles and built a special track to the plant and established a train service between the two points. The canal will not be done until next spring, the contractors having failed to finish it this fall, as was their original agreement. For its coke supply, the company has under construction a large coke producing plant in Pennsylvania, adjacent to its mines, located at Sykesville and Tyler, Pa. In the plant there will be 600 ovens, and they will have a daily capacity of about 1,500 tons of coke. None of the ovens are as yet completed, but the work has so far advanced on 300 ovens, one half the proposed number, that it is now expected that they will be producing coke within two or three months, giving about 750 tons of coke daily.

Judge Elwood C. Harris has been appointed receiver of the Thomas Slaight Lock & Mfg. Co., of Newark, N. J., a corporation engaged in the manufacture of padlocks. The liabilities of the concern are placed at $2,969 and the assets at $1,653.

Northern Engineering Works, crane builders, Detroit, Mich., report among recent shipments and sales of electric and hand traveling and jib cranes the following: U. S. Light House Board, Detroit, two 6-ton; Van Dorn Iron Works, Cleveland, one 15-ton electric; Proximity Mfg. Co., Greensboro, N. C., one 20-ton; Barnhart & Davis, Warren, Pa., one 5-ton; Dow Chemical Co., Midland, Mich., one 5-ton; city of Springfield, one 15-ton, with runway complete. They report a large increase of inquiries and quotations during the past month.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Backstrom Engine Co., Milwaukee, Wis., has been incorporated for the purpose of manufacturing turbine engines. The capital is $50,000 and the incorporators are: Charles Backstrom, T. J. Neacy and Walter Read. The Filer & Stowell Co., of which Mr. Neacy is president, has become interested in the manufacture of turbines, and the first output of the new corporation will be from that company's plant. Mr. Backstrom has obtained 25 patents on a new form of the turbine marine engine, and is hopeful that the engine will be the most successful yet evolved. In case the hope is realized a plant will be opened in Milwaukee.

The Illinois Malleable Iron Co., Chicago, has been incorporated with a capital stock of $452,900, to do general manufacturing. Incorporators are: Henry E. Bullock, James E. Bullock and James D. Sheahan.

The Welsh Machine Works, New York, have been incorporated with a capital of $50,000. Directors are: Frederick Welsh and Frank Feller, of New York, and Harry Young, of Brooklyn.

The McManus Mfg. Co., New York, has been incorporated with a capital of $25,000, to manufacture iron and steel. Directors are: Frederick Wurtz, W. B. Orcutt, C. E. McManus and others.

The Union Furnace Handle Co., Huntingdon, Pa., has been incorporated with a capital of $5,000. Directors are: James Morgan, Joseph S. Sillyman, Altoona; J. King McLauahan Jr., Hollidaysburg; and H. Himmelwright, Tyrone.

Eastwood & Mankin, Sherman, Tex., want prices on lathes, drill press, planers, shapers, milling machine, twist drill grinder and drills, shafting, pulleys, etc.

Gem Stove Co., West Point, Miss., wants prices on complete foundry equipment, including 40-horse-power half-arch front horizontal boiler, 20-horse-power horizontal engine, 32-inch cupola (after lining), blower and engine capable of melting six tons per hour, 28-inch drill press, nickeling outfit for stove work, emery stands, buffing and emery wheels, shafting, pulleys, hangers, rattlers, stove fittings, etc.

Semisteel Co., 701 New England Building, Cleveland, wants prices, f. o. b. Chagrin Falls, O., on jib crane, either wood or steel, capable of lifting five tons, for use in foundry; base to be 13 feet and boom 18 or 20 feet. Crane must have racking apparatus and be complete.

O. D. Murray & Co., Claremont, N. C., will buy lathes, steam-fitting tools, and other machine shop and foundry equipment.

Mr. C. Bracket, of the Bayview Northern Gas Co., and M. S. Ward, of the Kokomo (Ind.) wire mills, are promoting an enterprise for the establishment of a wire and nail mill at Petoskey, Mich. The company will be capitalized at $100,000.

The Savannah Pipe & Foundry Co., Savannah, Ga., has filed an application for incorporation to manufacture pipes and to carry on a general pipe and foundry business. Incorporators are: John F. Freeman, James H. McKenna, Thomas G. Philpot and U. H. McLaws. The capital stock is placed at $10,000, with the privilege of increasing to $50,000.

The Western Iron Works, St. Paul, Minn., have been incorporated with a capital of $10,000. Incorporators are: Edward J. Curry, James B. Mattieson, T. D. Palenaud and George Beals.

The Denning Wire & Fence Co., Cedar Rapids, Ia., has been incorporated with a capital of $50,000. Incorporators are: J. M. Denning, S. H. Matteson and L. L. Barnum.

The Lee Manquais Electrical Mfg. Co., Raritan, N. J., has been incorporated with a capital of $50,000, to manufacture and sell all kinds of electrical machinery. Incorporators are: Ernest B. LeManquais, New York; Philip Lindsley, Raritan, and Thomas A. McKennell, Mt. Vernon, N. Y.

William F. Braun, mechanical engineer and the inventor of a new automatic weighing machine, expects to form a stock

company to manufacture the machines at Muskegon, Mich. The capital is to be $150,000.

Fires and Accidents:—

The recent report of a fire at the plant of the Cyclops Steel Works, Titusville, Pa., was erroneous, as that plant has not had a fire. The fire in question was at the plant of the Titusville Forge Co., with which the Cyclops has no connection.

New Construction:—

Kearney & Trecker, Milwaukee, are adding two sections to their present shops, men now being at work on the concrete foundations for the buildings. When completed, the addition will be used for the present as an office and pattern shop, the space now occupied by the latter being given over to the machine shop.

The Central Iron Works, Syracuse, N. Y., whose plant was recently destroyed by fire, hope to have their new buildings erected within 60 days. The new buildings will be of brick with up to date machinery.

The American Steel & Wire Co. has installed a new battery of 28 boilers, equipped with chain grate stokers, at its Newburg, Cleveland plant. The HP mill of the company has been equipped with new boilers and smoke consuming devices and the company is planning to put in 20 new boilers with the chain grate stokers at the Consolidated mill, Cleveland.

President Shonts and General Manager Williams, of the Clover Leaf railroad, visited Decatur, Ind., recently and arranged with the Commercial Club of that city for the removal of the shops of that company from Delphos, provided Decatur raises the required amount of cash. The company expects to employ 125 men at Decatur.

The A. H. Nilson Machine Co., Bridgeport, Conn., will erect a shop, one story, 45 x 200 ft., with two ells each 30 ft. square. The plant will be of fireproof construction.

The Peerless Motor Car Co., Cleveland, will erect a large steel and brick building to be used as a machine shop.

The James Leffel Co., Springfield, O., is building for the Japanese government a 2,000-h. p. turbine wheel, which will replace a duplicate of this wheel shipped to Japan last June and destroyed by a Russian war vessel. The wheel will be used to drive a generator in a smelter plant.

The Geiser Mfg. Co., Waynesboro, Pa., is adding a foundry to the gas and gasoline engine plant at Greencastle, Pa., recently purchased.

The Sherwood Mfg. Co., Buffalo, N. Y., manufacturer of boiler and engine supplies, is now occupying its new plant. The main building is 50 x 120 ft. and includes the offices, ware and shipping rooms and tool making department on the first floor, and the brass finishing, polishing, steam testing room and nickel plant on the second floor. The converting building is 10 x 35 ft. The foundry is 50 x 100 ft. and is equipped with the latest appliances.

The Globe Machine & Foundry Co., Frankford, Philadelphia, has contracted for a new foundry, 55 x 91 ft.

The Missouri Valley Bridge & Iron Works, Leavenworth, Kan., will rebuild its plant recently destroyed by fire. Three buildings will be erected and some machinery will be purchased, although a considerable part of the machinery in the old plant was not badly damaged and will be used at the new works.

The Roderick Lean Mfg. Co., Mansfield, O., will erect two new buildings at the plant at Cambridge City, Ind., recently purchased. The Indiana plant manufactures cultivators, weeders and grain drills.

The Lorain Steel Co., Philadelphia, has awarded the American Bridge Co. the contract for the steel for the addition to its plant at Johnstown, Pa. It is expected that the building will be completed by February 1. It will be 165 x 250 ft.

The new plant of Pawling & Harnischfeger, Milwaukee, Wis., will be in operation January 1. The main building is 350 feet square and includes the bridge, erecting and machine shops. The power house is 44 x 105 ft., the foundry is 108 x 150 ft. with side extensions for storage purposes. The pattern shop and pattern storage house are each 50 x 165 ft., one and three stories high, respectively, and of slow burning mill construction. The office building is 60 x 75 ft., three stories. All foundations are concrete, with walls of brick and structural steel. The machinery of the old plant will be transferred to the new works as soon as these are completed. The new equipment needed has been ordered.

The first of the new shops of the Louisville & Nashville railroad, Louisville, Ky., was placed in operation last week. All of the shops cover about 60 acres under roof, and have been erected at a cost of $2,250,000, including contracts outstanding for the delivery of machinery, which will be installed immediately. It is the plan of the management to have the shops in complete operation by the first of the year. The first building to be opened is the freight repair shop, where the rolling stock tributary to Louisville is being sent to be fitted for the road. The largest shop is the erecting and boiler shop. It is centrally located and its dimensions are 813 x 170 ft. Grouped around the big building are the iron and brass foundry, the pattern and storage building, the wheel and pipe shop, the blacksmith shop and other structures. All of the buildings are of steel frame construction.

The Union Machine Co., Fitchburg, Mass., has purchased 100 acres at Westminster, Mass., where it will probably erect a plant next spring.

Repairs and additions to cost approximately $25,000 are now under way at the wire fence plant of Kitselman Bros., Muncie, Ind. The plant now employs about 200 men and is one of the prosperous industries of the city.

The Standard Oil Co. expects to build a plant at Richmond, Cal., for building tank cars and making repairs on such cars. The building will be of brick, 150 x 50 ft., equipped with modern machinery.

Concerning the future of the Union Iron Works of San Francisco Charles M. Schwab has been quoted as saying that the plant will be enlarged and made the finest in the United States. Mr. Schwab and his party left San Francisco Sept. 20 for the East.

The B. Henley Swivel Coupling Co., Youngstown, O., recently incorporated, is erecting a plant at Edenburg, O. The headquarters will be in Youngstown.

The Tuthill Spring Co., Chicago, will erect a building 200 x 120 ft., one story, to replace the one destroyed by fire Aug. 18. Ground will be broken as soon as the architect can prepare the plans.

General Industrial Notes:—

The forge department of the American Car & Foundry Co., located on River street, Detroit, which has been closed for about two months, resumed operations a few days ago. About 350 men will be employed.

The Evansville & Terre Haute railroad will not remove all its shops from Evansville, Ind., to Danville, Ill., as reported. The heavy work that has heretofore been done at Evansville will be done at Danville, but the shops will be maintained at Evansville for the lighter work.

Long & Lefever is the name of a new firm which is just established to manufacture bed springs and gates at Hagerstown, Md. The concern starts under auspicious circumstances.

The Electric Controller & Supply Co., of Cleveland, announces the opening of its Southern branch office at 509-510 Woodward building, Birmingham, Ala. This company is now represented in the following cities: New York, Philadelphia, Pittsburg, Cleveland, Birmingham, Ala., Denver, San Francisco, and London, Eng.

The Cayuta Mfg. Co., Sayre, Pa., recently incorporated, has taken over the business of the Sayre Moulding Co., Ltd. The new company will manufacture light machinery and light railroad and other specialties.

T. M. Kirkwood, or Toronto, Can., has purchased a complete outfit for a new rolling mill plant which he is to build at Winnipeg, Man. The plant is to be a modern, up to date mill for the production of merchant bar iron.

The nail and wire departments of the Colorado Fuel & Iron Co. are reported to be shipping larger consignments to common points in Kansas, Nebraska and Missouri than ever before, taking advantage of the recent reduction in freight rates. The wire mills started a few days ago on double turn.